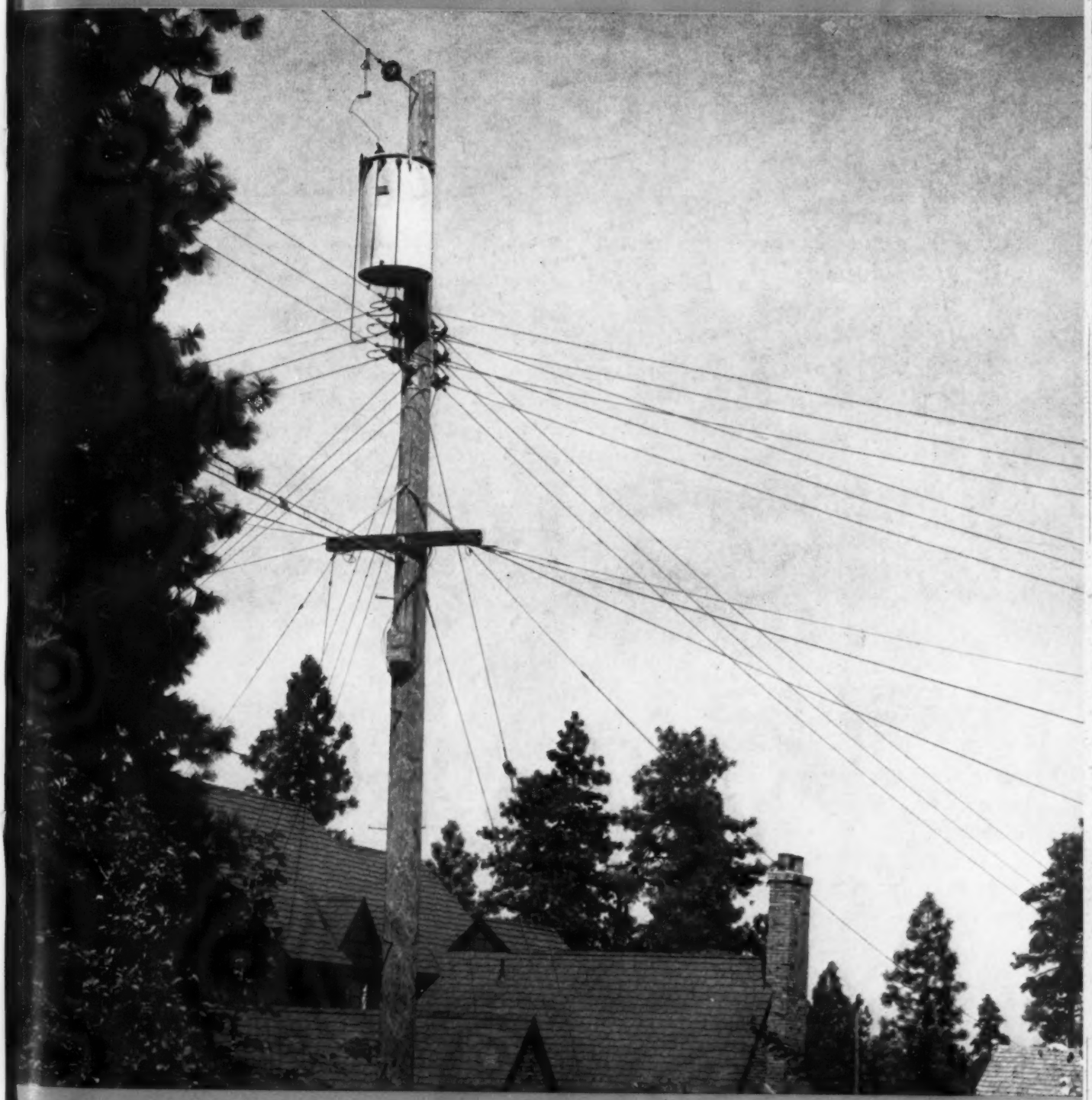
ELECTRICAL WEST

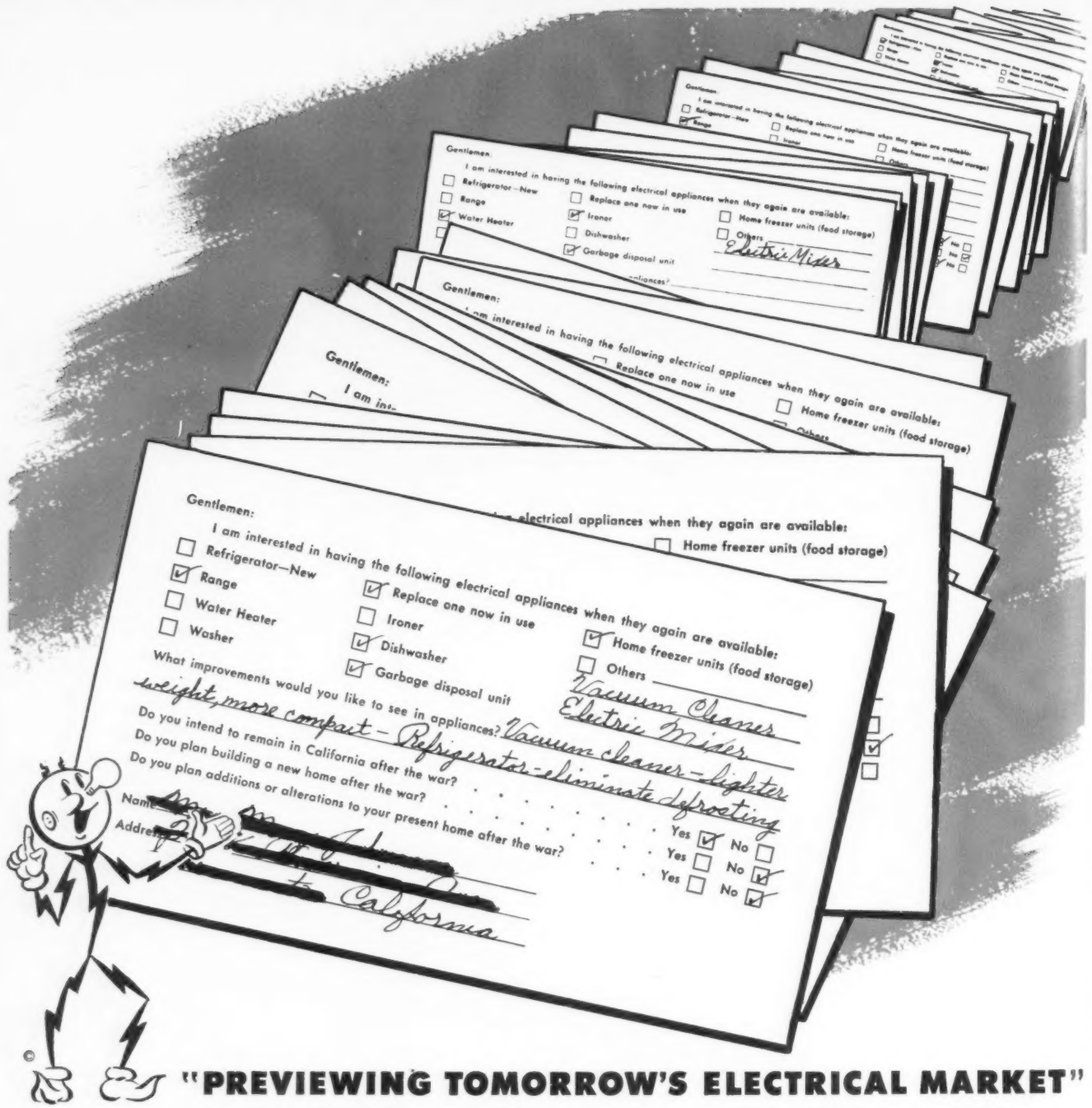
SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED SECTION OF THE U. S.



McGraw-Hill Co. of California

NOVEMBER 1944

25c a Copy


Gentlemen:
I am interested in having the following electrical appliances when they again are available:
Refrigerator—New
Range
Water Heater
Washer
Replace one now in use
Ironer
Dishwasher
Garbage disposal unit
Home freezer units (food storage)
Others
Vacuum Cleaner
Electric Mixer
What improvements would you like to see in appliances? Vacuum cleaner—lighter weight, more compact—Refrigerator—eliminate defrosting
Do you intend to remain in California after the war? Yes No
Do you plan building a new home after the war? Yes No
Do you plan additions or alterations to your present home after the war? Yes No
Name
Address
to California

"PREVIEWING TOMORROW'S ELECTRICAL MARKET"

An enthusiastic response is being received in answer to a questionnaire recently sent to Edison customers. Thousands of Central and Southern California housewives are indicating their wants and needs for electrical appliances when they again are available . . . many are suggesting improvements. Their answers are revealing, sometimes surprising and, taken all together, highly gratifying. They will be valuable in shaping post-war merchandising plans.

The Edison Company now is planning similar questionnaires to gain advance information about the future market for farm electrical equipment, better home wiring, etc. The market data obtained from these surveys will be made available to appliance manufacturers and dealers to help them prepare for coming selling opportunities.

SOUTHERN CALIFORNIA EDISON COMPANY LTD.

ELECTRICAL WEST (with which is consolidated The Journal of Electricity), November, 1944. Vol 93, No. 5. Published monthly by the McGraw-Hill Company of California, 68 Post Street, San Francisco, 4, Calif. Entered as second class matter at the post office at San Francisco under the Act of March 3, 1879. Additional entry as second class matter at the post office at Los Angeles. Printed in U. S. A. Subscription rate in U. S. and U. S. possessions, Canada and Pan-America, $2 per year; all other countries, $3 gold. Single copy 25c.
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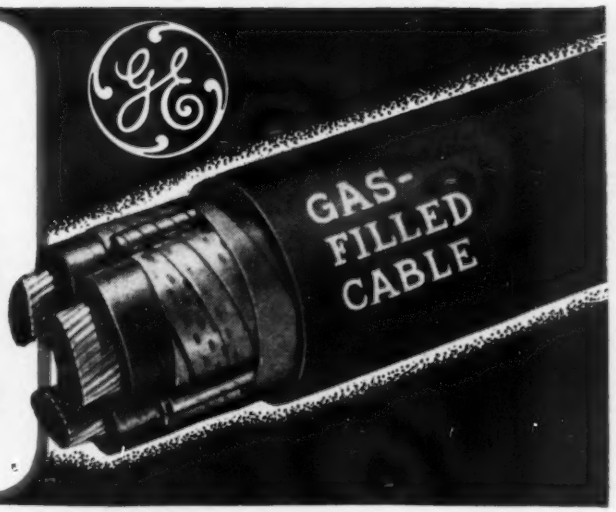
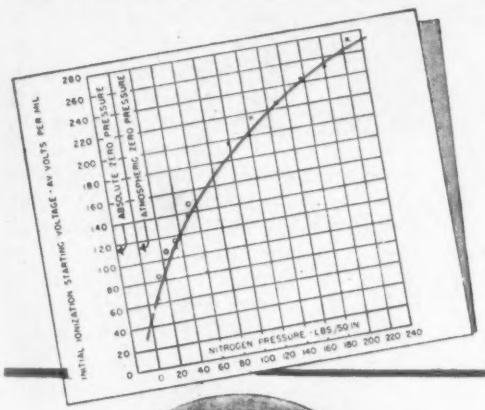
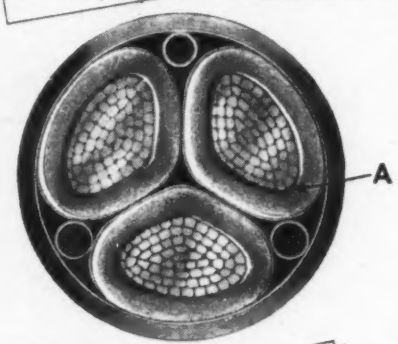
What we mean when we say this cable is SELF-HEALING UNDER STRESS

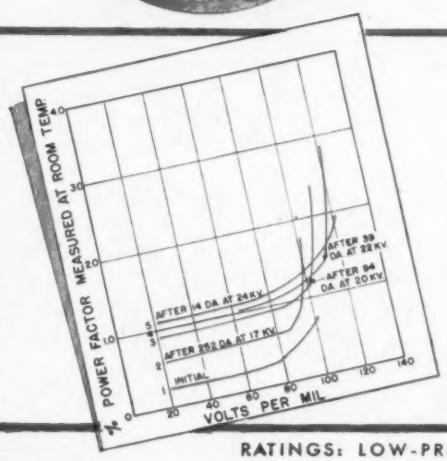



INITIAL IONIZATION STARTING VOLTAGE - KV VOLTS PER MIL
ABSOLUTE ZERO PRESSURE
ATMOSPHERIC ZERO PRESSURE
NITROGEN PRESSURE - LBS./SQ.IN.

SUPPRESSION OF THE IONIZATION that occurs under voltage stress is vital to the dielectric strength and life of cable insulation. This ionization begins in the tiny pockets of gas in the voids and butt spaces of the paper-tape wrappings. The first factor acting to minimize it, in gas-filled cable, is the pressure of the gas itself (see chart). Within the safe limits of lead-sheath strength, higher pressures permit higher voltage stresses before ionization begins.



DISTRIBUTION OF IMPREGNATING COMPOUND so as to fill the critical voids in the high-stress fields (A) is a further defense against cumulative ionization effects. In G-E mass-impregnated, gas-filled cable, "automatic grading" helps concentrate the mobile impregnating compound at the points of greatest stress, (A). Then, should ionization persist from overvoltage, still another factor comes into action.


POWER FACTOR MEASURED AT ROOM TEMP
AFTER 14 DA AT 24 KV
AFTER 39 DA AT 22 KV
AFTER 84 DA AT 20 KV
AFTER 252 DA AT 17 KV
INITIAL
VOLTS PER MIL

AS THE MOBILE IMPREGNATING COMPOUND used in G-E gas-filled cable is drawn into ionized gas pockets by electrostatic attraction, it changes chemically to a form known as "X-wax." This formation of X-wax continues until voids are filled. Ionization is extinguished. *Self-healing* has taken place.

Taken together with the self-supervising feature which warns of sheath damage, this *self-protecting ability* of G-E mass-impregnated gas-filled cable helps explain why we regard it as tomorrow's universal cable-type within its recommended voltage range. ***General Electric Company, Schenectady 5, New York.***

RATINGS: LOW-PRESSURE TYPE, 10 to 40 KV; MEDIUM-PRESSURE TYPE, 40 to 69 KV

GENERAL ELECTRIC

501-24-1200

BUY ALL THE BONDS YOU CAN—AND *KEEP ALL YOU BUY*

ELECTRICAL WEST

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Cover photo: 13-kv. streamlined distribution at Spokane

CHANGE OF ADDRESS

Circulation Manager,
Electrical West,
68 Post St.,
San Francisco 4, Calif.

Please change my address

From .....

To .....

Signed .....

People

C. F. Myers engineer in charge of transmission and distribution of the general engineering department of Puget Sound Power & Light Co., who describes the 4-kv. primary network of his company, p. 60, is one of the younger engineers of the Northwest who has made rapid strides. Graduated from MIT in 1928, he worked for Stone & Webster while a student, going with Puget Sound Power & Light in 1929. He served successively as distribution engineer in Everett, assistant-superintendent Central Division, and in 1942 was advanced to his present position.

Preview

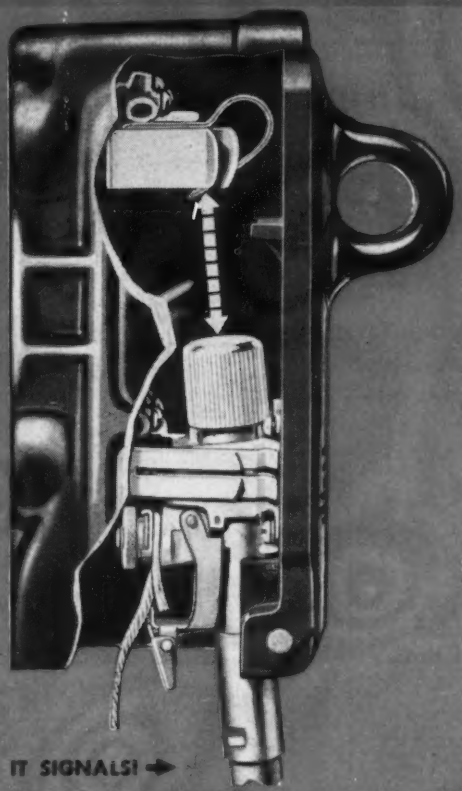
Among December's variety of stories of interest and value to every branch of the industry will be—the first Navy released story on the electrical installations on the floating drydocks which move the Navy's repair facilities close to the theatre of action; how a utility uses two-way car radio for dispatching on trouble calls; results of some surveys of the public which point the way to sales by dealers and distributors postwar; a concise but comprehensive report of the things of value brought up at the two Pacific Coast Electrical Assn. conferences in Los Angeles and San Francisco this month; plus trends, news, interpretation, all significant stuff which active men and women in this industry need and use to chart their business course in this changeable world.

Apology

is made to readers for the lateness of our magazine. Despite all efforts and programming, the delays in transportation, shortages of manpower and the results of the same difficulties from those on whom we depend to print and deliver the magazine, have accumulated and in total have made us later than we ever believed possible.

To Get 4-Way Protection*

Get L-M "PVD" Fuse Cutouts



IT SIGNALS! →
This tube in indicating position easily seen from ground—saves hunting, saves time.

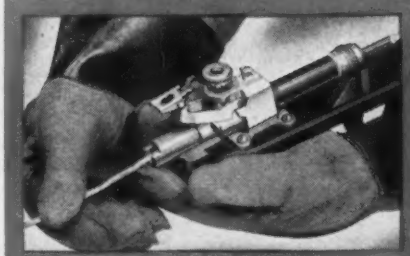
Check these advantages of using L-M "PVD" disconnecting Fuse Cutouts—instant, smooth, dependable action; protection to the cutout, which means long life; safe re-fusing; time saved in locating the blown fuse, and in replacing it, which helps restore service more quickly. That's why so many Utility Men prefer "PVD's," find it a sound investment to standardize on them.

L-M "PVD" Fuse Cutouts are made in four sizes: 5000-volt and 7500/12500-volt ratings, each in 50 and 100 ampere capacity. "PVD" Fuse Cutouts are outstanding in performance and service characteristics. Get the details. Ask the Line Material representative, or write Line Material Company, Milwaukee, Wisconsin, for complete information.

* 4-WAY PROTECTION

* **1. Protects the Line:** Instant separation of blown link . . . no arcing between contacts . . . smooth, positive dependable action.
* **2. Protects Cutout** itself. The Bakelite door is always closed . . . internal parts are always protected from dirt, weather, corrosion.
* **3. Protects the Lineman:** On-the-pole re-fusing is a safe, simple operation, even for a man with gloves on.
* **4. Protects your Service:** Dropped-out cartridge signals—easily seen from ground—avoids hunting. Re-fusing takes only 6 seconds with spare fused door—cuts outage time.

HERE'S THE CYCLE OF OPERATION

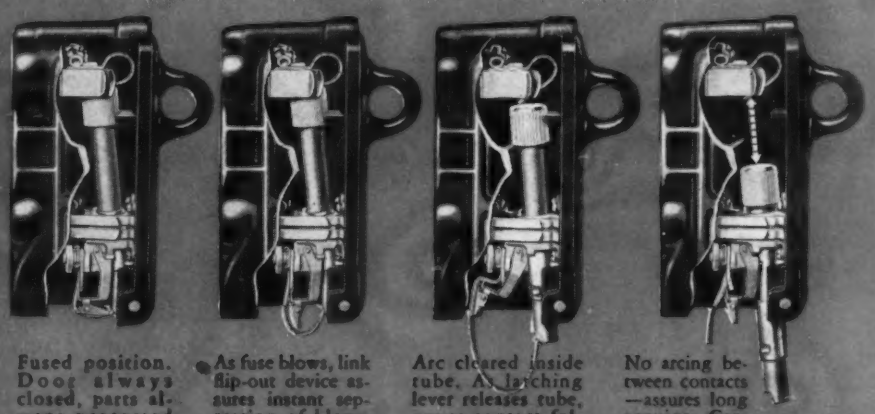


ONE-MINUTE RE-FUSING

On-the-pole re-fusing of "PVD" Fuse Cutouts is a safe, easy operation, is quickly done, even with gloved hands.

6-SECOND RE-FUSING

Lineman just opens and lifts off old door, and slams on spare fused "PVD" door. Bakelite doors interchangeable—save time in restoring service.



Fused position. Door always closed, parts always protected from weather, dirt, corrosion. *Operation is independent of door.*

As fuse blows, link flip-out device assures instant separation of blown link parts, before latching lever releases tube to indicating position.

Arc cleared inside tube. A latching lever releases tube, upper contact follows tube partway, gives extra time to clear arc, assures positive drop.

No arcing between contacts —assures long service. Cartridge drops to indicating position—easily seen from ground; leaves large gap between contacts.

LINE MATERIAL
FUSE CUTOUTS & FUSE LINKS

L-M DISTRIBUTION EQUIPMENT INCLUDES: Distribution Transformers • Fuse Cutouts and Fuse Links • Lightning Arresters
Oil Switches • Pole Line Hardware • Line Construction Specialties • Underground Equipment • Fibre Conduit • Street Lighting Equipment

SYLVANIA NEWS
CENTRAL STATION EDITION

NOVEMBER *Published in the Interests of Better Sight and Sound* 1944

K. C. Employs Boosters to Lick Low-Voltage vs. Fluorescent Problem

In certain buildings in Kansas City, poorly designed wiring systems presented an annoying problem whenever a fluorescent installation was made. The operating voltage was often so low that flickering lamps and slow starting resulted.

The problem was investigated by Arthur E. Smiley, of the electrical contracting firm bearing his name, and Marshall A. Havenhill, illuminating engineer of the Kansas City Power & Light Company; and they recommended booster transformers to raise the voltage to the ideal 118 volts whenever a fluorescent lighting system was proposed.

In small stores and offices where the load is not great, boosters are installed directly ahead of the lighting distribution panels.

And in larger installations, where there are many sub-feeders and lighting distribution panels, the boosters are best installed ahead of the panels containing the branch circuits for the fluorescent lighting systems.

DID YOU KNOW...

Motors operating at full speed are made to appear motionless under the stroboscopic light produced by Sylvania's electronic Strobotron tube? Thus "trial-and-error" trouble shooting is fast being eliminated in many industrial applications.

★ ★ ★

That the Sylvania Blacklight Lamp, when used in a child's nursery, will illuminate wall decorations in a night-darkened room? Bad news for the bogey-man.

★ ★ ★

That a tiny device called the Recorder Lamp —made by Sylvania—makes possible the accurate transmission of photos by radio? This lamp faithfully records the photo, as it is being broadcast on sensitized paper.

Fixture Competition Spurs Interest Among Utility Lighting Groups

Designers Competing for Total of $1600 in Prizes to be Awarded by Sylvania

Hundreds of entries—representing every state in the Union—have been received in the Sylvania Fluorescent Fixture Design Competition. This enthusiastic response is gratifying, for it re-emphasizes the keen and constant interest of utility lighting men in better fixture design.

DEAD LAMPS CUT OFF BY STARTER

A newly designed fluorescent lamp starter —recently placed on the market by Sylvania—takes over the job of cutting dead lamps out of the circuit.

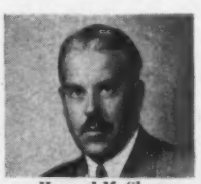
Lamps that have failed in service, if allowed to remain in the circuit, cause undue power losses, and may result in overheating ballast and damaging starter.

The new Sylvania device, known as the COP (Cut-Out Premium) Starter, will handle the cutting out automatically. Under failed lamp conditions—with starting current repeatedly flowing—sufficient heat is generated in a resistor to operate a bimetal-latch which breaks the circuit to the failed lamp. A push button resets the starter for normal operation.

"But the night shift never knows when it's daylight since we put in Sylvania Fluorescents. Gentlemen, we need a rooster."

JUDGES READY AND WAITING

On December 1, the judges will begin their task of deciding which fourteen designs for a post-war commercial four-lamp fluorescent fixture are best. In view of the large number of entries, theirs will be a big job. January 1 is the date set for the announcement of winners' names.



Howard M. Sharp

Allan E. Parker

C. A. Carpenter

Lurelle Guild

DELIVERY DATE IMPORTANT

We would like to urge all entrants to schedule their work so as to insure mailing of their designs to Sylvania, Salem, Mass., *before December 1.* This is a rigid requirement. Each design will—and must —receive the careful consideration of all judges; hence, the deadline cannot be extended beyond November 30, 1944.

Don't forget the prizes!—$500, $300, $200, $100—plus an expense-free trip to New York where the major prizes will be awarded. And ten additional prizes of $50 each will be mailed to those who enter the ten next best designs.

SYLVANIA ELECTRIC PRODUCTS INC.
Salem, Massachusetts
MAKERS OF FLUORESCENT LAMPS, FIXTURES, ACCESSORIES, INCANDESCENT LAMPS, RADIO TUBES, CATHODE RAY TUBES, ELECTRONIC DEVICES

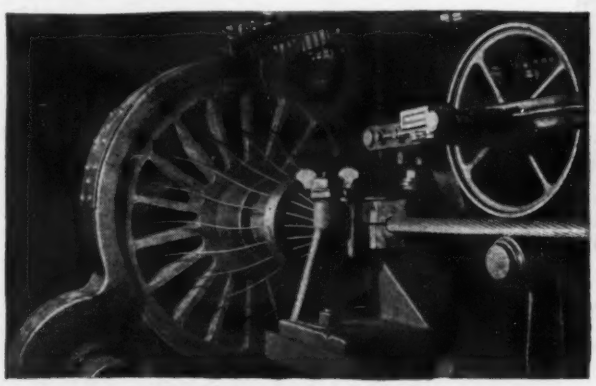
1. Twin ingots of aluminum.

2. Rolled by experts in this giant, modern mill.

3. Large coils result in long lengths of cable.

A.C.S.R. owes its fine quality to this good start in life

More than a million miles of A.C.S.R. (aluminum cable, steel reinforced) now span the nation. Over a quarter century of service on rural and hi-lines testify to the great dependability and economy of Alcoa A.C.S.R. ALUMINUM COMPANY OF AMERICA, 2132 Gulf Building, Pittsburgh 19, Pennsylvania.



5. Stranded into cable, combining steel for strength and aluminum for high conductivity and long life.

4. Drawn into wire on a continuous draw bench.

ALCOA A·C·S·R

ALUMINUM CABLE STEEL REINFORCED

A GREAT NEW LINE
K

...OF REFRIGERATORS!

A most important answer to—
WHAT'S AHEAD AT KELVINATOR?

In the great postwar refrigerator market to come, Kelvinator retailers can look forward to this:

—In the first postwar models—to achieve maximum production as quickly as possible for Kelvinator retailers—there will be few changes. But these changes will be important ones . . . incorporating as many improvements for better food preservation as is possible in present cabinet styles.

—Later, a completely NEW postwar line of refrigerators incorporating a startling new conception of home refrigeration will be announced. Soundly engineered, brilliant new ideas in frozen storage facilities and high humidity cabinets can be expected.

In addition:

—A genuine Selective Dealer Policy that means *more sales and profits per dealer.*

—A "retail-minded" merchandising program designed to give new impetus to Kelvinator's outstanding pre-war successes . . . a program to enable Kelvinator and Kelvinator retailers to work even closer together than ever before in attaining a common goal of *more sales per dealer.*

Here is the cornerstone in the Kelvinator retailer's great postwar opportunity to build a sound, highly profitable, long-term business future.

Kelvinator's plans for getting Kelvinator Refrigerators into homes and on utility power lines as quickly as possible after victory are only one part of Kelvinator's overall program to get Kelvinator Refrigerators, Electric Ranges, Home Freezers and Electric Water Heaters in the home —where they will help build the greatest domestic load utilities have ever experienced.

Look Ahead with N-K *KELVINATOR*

DIVISION OF NASH-KELVINATOR CORPORATION

Kenosha • Milwaukee • DETROIT • Grand Rapids • Lansing

If you have ever been up on a 50-foot stick with a winter wind whistling around your ears . . . if you have ever had to work on tough-stranded cables, or heavy insulated wire under these conditions, you know how important good equipment is.

Tough jobs are the best laboratory to test the true quality of tools and equipment, and in this laboratory of actual use, Klein's have been proving their high quality "since 1857."

Men on the pole recognize the importance of quality pliers and wrenches, safety straps and belts, grips and connectors—that's why you will find so many "linemen are Kleinmen."

Since 1857

ASK YOUR SUPPLIER

Foreign Distributor: **International Standard Electrical Corporation, New York**

This book on the care and safe use of tools will be sent without charge upon request.

Mathias KLEIN & Sons
Established 1857 **Chicago, Ill., U.S.A.**
3200 BELMONT AVENUE, CHICAGO 18, ILLINOIS

PRODUCTS

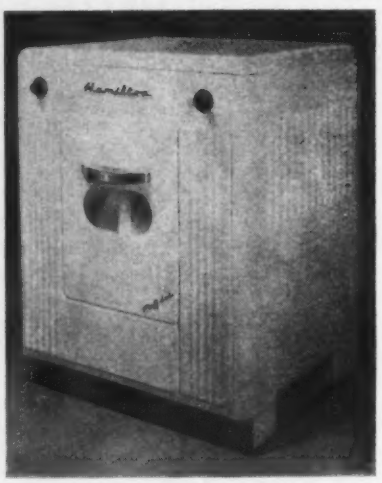
that are news

Fry Kettle (1100)

Available to civilian users on WPB approval is a new Hotpoint-Edison automatic electric fry kettle, designed for large restaurants, hotels and institutions. According to the manufacturer, this K46 model will increase work capacity approximately 40% and will sell at 32% less than the former model. Features claimed for it are a sediment well, which permits removal of sediment without draining kettle; dual basket supports, front for loading and rear for draining and storing. The kettle is said to preheat quickly, to have rapid recovery. The 18-kw. energy input balanced with fat capacity increases output, according to the manufacturer.

Clothes Dryer (1101)

Hamilton Mfg. Co. has announced that it will manufacture an automatic clothes dryer following the war. An electric and a gas model will be available, the company states. This dryer is said to damp-dry an average washer load in 15 to 25 minutes and to hold a maximum washer load of 9 lb. of dry clothes. An automatic thermostat is provided to shut off heating element and protect clothes. Construction is steel with white enamel finish. Dimensions are 39 in. high, 31 in. wide, 25 in. deep.



Circuit Breaker (1102)

Westinghouse is making a 100-amp De-ion circuit breaker, which it claims requires less space and permits lighter structures for distribution panelboards, built-in applications and bus duct plug-ins. A new F frame is said to permit a 100-amp, 600-volt a-c or 250-volt d-c breaker in the same space formerly required by the 50-amp. 600-volt a-c or 250-volt d-c rating.

Steam Iron (1103)

A new model automatic electric steam iron has been announced by the Silex Co. A three-way groove in the sole plate which forces a horizontal sheath of steam over the ironing surface and a lever permitting change from steam to dry heat during the ironing process are features claimed by the manufacturer.

Service Calls GO DOWN
Customer Good Will GOES UP
When Multi-breakers GO IN!

It's a matter of record that Square D Multi-breakers reduce service calls—drastically. A good example is the case of one Utility which has 30,000 circuit breakers installed on a 40,000 meter system. Here are the facts:

In one area comprising 10,000 meters, but only 40% having circuit breakers, trouble calls for so-called fuse failures average 350 per month: whereas, in another area comprising 5,000 meters, but 100% circuit breaker equipped, there are only 15 to 18 such calls per month.

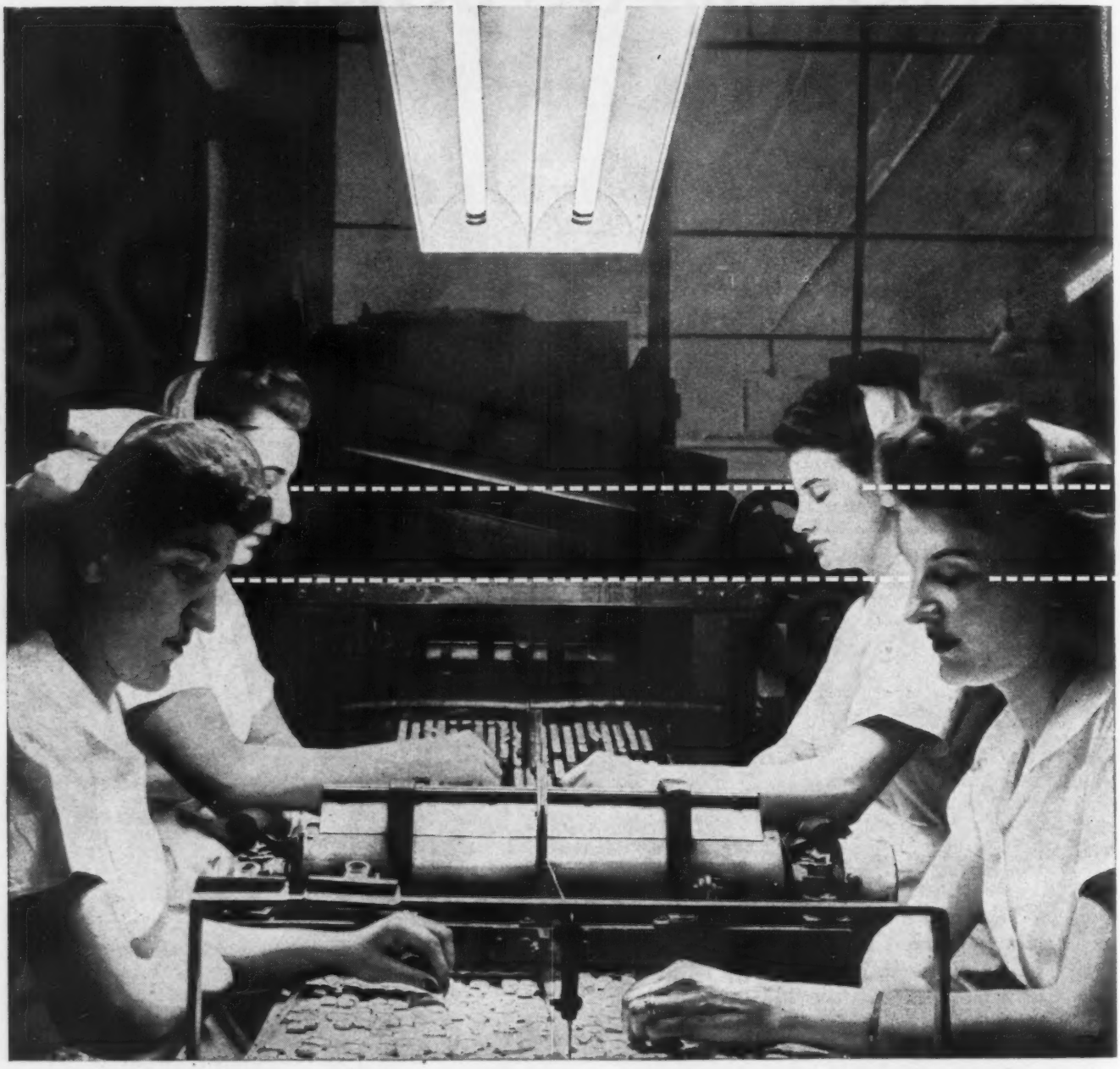
Wherever Utilities have installed Multi-breakers in sufficient numbers to establish performance comparisons with fusible equipment, Multi-breakers have shown these advantages: They reduce service calls and revenue losses. They provide a proven antidote for customer ill-will which is generated by the inconvenience of blown fuses. For, right or wrong, the customer often blames the Utility for these service interruptions.

Shall we send you a copy of Bulletin 4000 which gives the complete Multi-breaker story? Address Square D Company, 1320 E. 16th Street, Los Angeles 21, California.

• The Multi-breaker eliminates fuses completely. When a short circuit or dangerous overload occurs, the circuit is cut off automatically. A simple movement of the lever restores current. There are no delays—nothing to replace, nothing to buy or store.

SQUARE D COMPANY

LOS ANGELES · DETROIT · MILWAUKEE



HELP SHORTEN THE WAR...BUY MORE BONDS THAN BEFORE!

TOMORROW...

Tomorrow, lamps and light will serve America in new ways, new forms, new places. Westinghouse Mazda Lamps in new shapes and colors, along with new techniques in lighting, will open up a whole new field of decoration and display for the store owner. And Westinghouse Sterilamps—already widely applied by laboratories and food and drug manufacturers to reduce contamination from air-borne bacteria—will be used in homes, schools and public buildings to lessen the risk of infection and help bring safer, more healthful living.

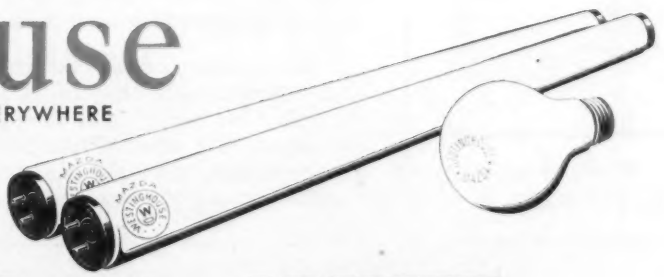
THESE EYES

must watch a parade of millions

★ Cool, soft, eye-easy light from Westinghouse Mazda Fluorescent lamps enables these four inspectors to scan millions of gleaming white pieces of gum in a day. And with See-ability to aid their search for blemishes or defects, not one in a hundred thousand pieces gets by! See-ability helps workers do a better job—faster, more efficiently. Under See-ability conditions, mistakes are fewer, accidents reduced, materials saved, inspection speeded. And See-ability is welcomed by employees, too. For it lessens eye-strain and fatigue, promotes health and well-being. With the end of the war, will come new and bigger demands for See-ability in factories, stores, offices and homes. Whether you are modernizing existing installations or planning new ones, be sure to give your customers the advantage of See-ability with bright, long lasting Westinghouse Mazda lamps. Westinghouse Electric & Manufacturing Company, Bloomfield, New Jersey.

Westinghouse

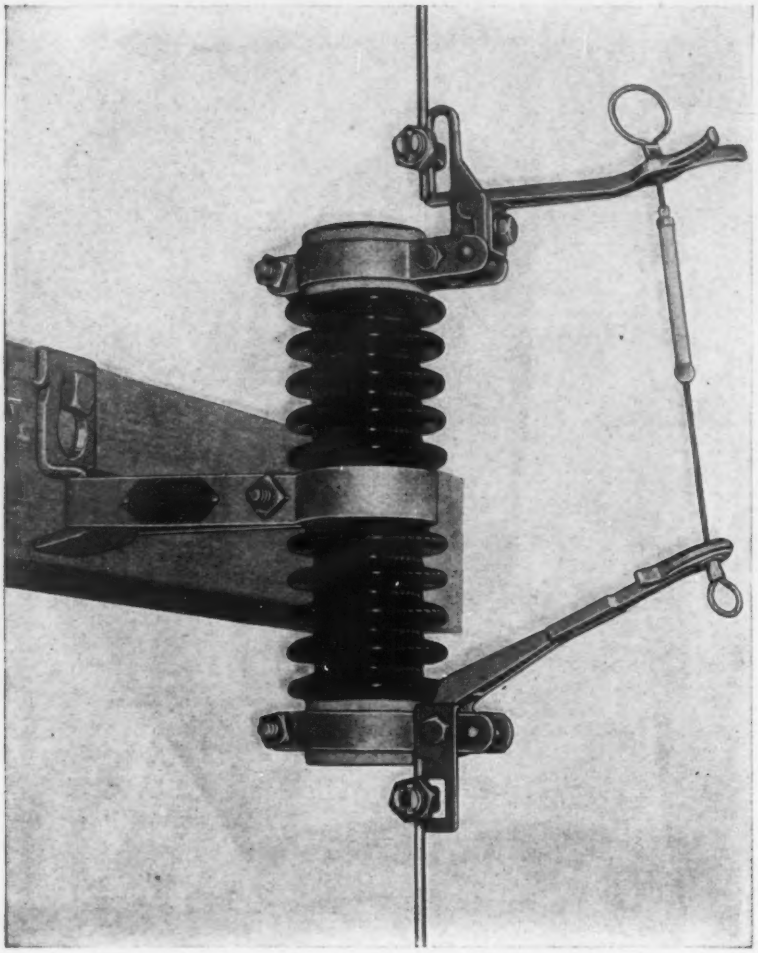
PLANTS IN 25 CITIES OFFICES EVERYWHERE

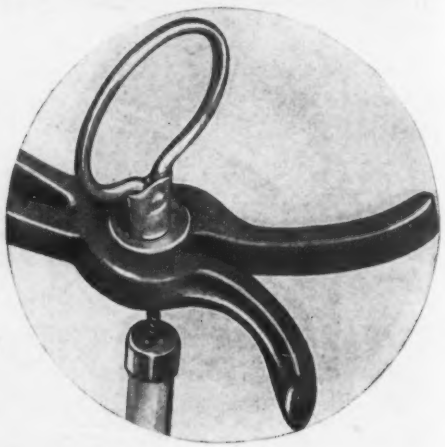


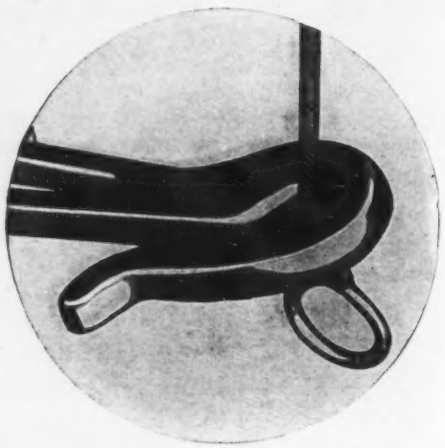
MAZDA LAMPS FOR SEE-ABILITY

WESTINGHOUSE PRESENTS JOHN CHARLES THOMAS • SUNDAY 2:30 EWT., N.B.C.
TED MALONE • MONDAY, WEDNESDAY, FRIDAY, 10:15 EWT., BLUE NETWORK

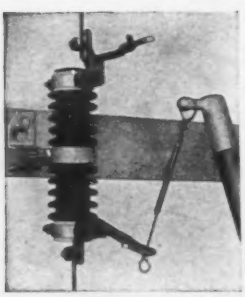
STURDY–LOW COST MATTHEWS PROTECTOLINK CUTOUTS







Catalog 1640-50 Amp. 7.5/12.5 KV. Grd. Y — Catalog 1641-50 Amp. 15 KV.



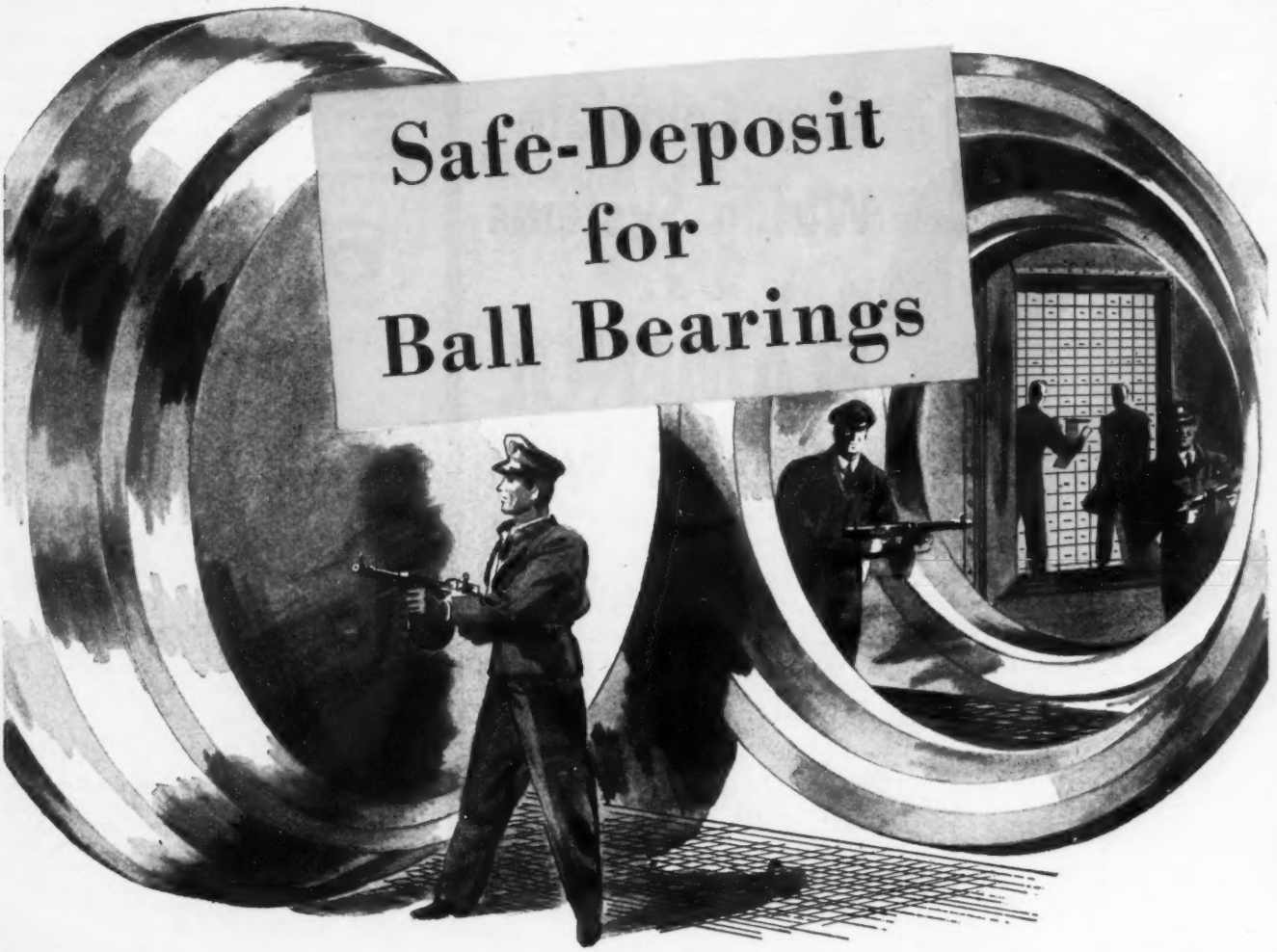
Write for Bulletin 101-A

The design and ruggedness of Matthews Protectolink Cutouts and Protectolinks insures better performance and lower maintenance costs.

Because of the rigid construction of the contact arms they cannot be easily bent out of alignment when fusing or installing the cutout and the fact that the lower arm is actuated by an individual spring, assures positive contact tension on the Matthews Protectolink.

Note design of the contact ends of the arms. They provide easy installation and automatic seating of Protectolink buttons into the cup shaped contact recesses. No wedging of fuse link into contacts is required, thereby preventing damage to fine wires of fuse link cable. Matthews Protectolink Cutouts will also accommodate any make of open link fuse, and Matthews Protectolink Fuse Links fit other makes of open link cutouts.

W. N. MATTHEWS CORPORATION
SAINT LOUIS, U. S. A.
ENGINEERS and MANUFACTURERS SINCE 1899



With ball bearings as scarce as they are today, a lot of manufacturers probably wish they could keep theirs in a safe-deposit vault.

Well, of course you can't do that, but there is one sure way you can protect the finely polished surfaces of your ball bearings and that's by putting Ballroll grease around them. That's because Ballroll was especially developed by Union Oil Company as a bearing lubricant. It effectively seals out dust, dirt and

other foreign matter. It guards the highly machined bearing steel against corrosion from atmospheric moisture – important because the most minute rust pits in a ball bearing can be responsible for trouble.

Ballroll grease has a low internal friction coefficient. This means the bearings and shaft can turn with a minimum of resistance from the grease. Bearing greases which do not possess this easy shearing quality overheat from their own "churning" action to the point where they disintegrate. When this happens, the bearings run hot. Friction develops rapidly and bearing and race surfaces are roughened and ruined.

Ballroll's high melting point means added protection against heat from external sources—yet it remains smooth and slippery in frosty weather. Made from the finest oil stocks, its stability protects against separation and assures you dependable, long-lasting lubrication.

Ballroll grease comes in several grades and may be used for every type of bearing surface, whether ball, roller or flat. A phone call to your local Union Oil Company representative will inform you as to the best grade for your particular job. Call him today. Make sure you are getting top-quality protection. Buy Ballroll.

BALLROLL

Another
UNION OIL
Success-Tested Product

Approved by the Underwriters'

For Complete Wiring Systems USE FLAMENOL BUILDING WIRE

(Small Diameter—Thermo-plastic Insulated)

Type SN

FOR DRY LOCATIONS

Type SNW

FOR WET LOCATIONS

USE Flamenol* Building Wire for new wiring, rewiring or maintenance wiring. Use it for feeders, branch circuits or special wiring. This all-purpose, small diameter, thermo-plastic insulated building wire is easy to install and will give long dependable service. Two types are available: Type SN Flamenol wire for use in dry locations; Type SNW Flamenol wire for use in wet locations.

Whole buildings can be wired with Flamenol Building wire using either Type SN or Type SNW or both—whatever conditions require. The insulation of both these wires has long life, is high in dielectric strength, is flame retarding and is resistant to oils, acids and alkalies. In addition, Type SNW Flamenol wire insulation has low moisture absorption.

For further information see the nearest G-E Merchandise Distributor or mail the coupon for descriptive folders.

General Electric Company, Section W1141-18
Appliance and Merchandise Dept.,
Bridgeport, Conn.

Sirs: Please send me the folders on Type SNW and Type SN Flamenol Small Diameter Building Wire.

Name .....

Address .....

City ..... State .....

BUY WAR BONDS AND KEEP THEM

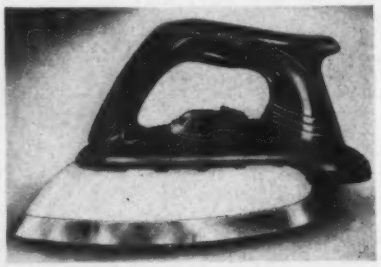
Hear the General Electric radio programs: "The G-E All Girl Orchestra" Sunday 10 P.M. EWT, NBC. "The World Today" news every weekday 6:45 P.M. EWT, CBS.

*Reg. U.S. Pat. Off.

GENERAL ELECTRIC

Automatic Irons (1104)

Under recent OPA and WPB rulings, Landers, Frary & Clark is manufacturing two types of automatic irons, the Universal Glider and the Wrinkle Proof. The former, illustrated, weighs 4 lb.; has a control for heat adjustment to various fabrics and airports which protect the hand from rising



heat. The sole plate is rounded to prevent wrinkling of fabrics on the backstroke. The top deck is black baked lacquer, the cap is white porcelain enamel, the sole plate chromium plated.

The other model has many of the same features. It comes in baked black lacquer top deck, black porcelain enameled cap, Bower Barff heat treated sole plate.

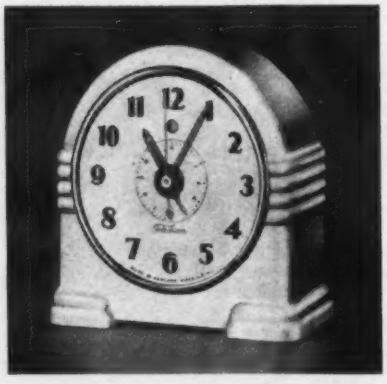
Varnish (1105)

A fungus resisting impregnating varnish, PG-4-FC, for all types of electrical windings is being manufactured by the John C. Dolph Co. This baking varnish is made to protect each layer of wire, the manufacturer states, and if the surface of the winding is damaged, the fungicidal protection is still retained. Degree of hardness can be controlled by altering the baking time and temperature.

V-S Drive (1106)

Lombard Governor Corp. has a variable-speed drive which it states consists of a simple gearing for transmitting the power and a light V-belt for varying the speed ratio. Through this gearing arrangement, 90% of the power is said to go through the conventional gears and only 10% through the V-belt. Light weight and small size are other features claimed for the unit.

Electric Clock (1107)



Following a brief pooling arrangement under which it made unbranded "war" alarm clocks, the Warren Telechron Co. has announced resumption of manufacture of electric alarm clocks under its own name. The first model, illustrated, will retail at $4.95, it is stated.

MOTOR TRUCK NEWS FLASH!

FWD TRUCKS AVAILABLE FOR CIVILIAN PURCHASE ON AND AFTER JANUARY 1, 1945

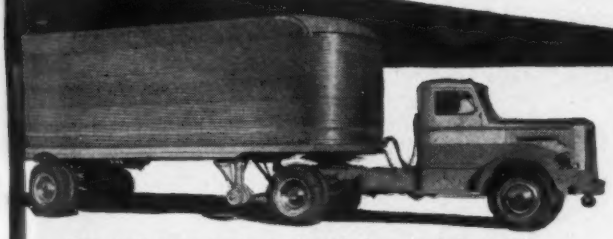
GOOD NEWS — FWD four-wheel-drive trucks, pre-eminent in war services, with production previously restricted almost exclusively for the military, are soon to be available for motor transport, highway, utility, oil fields, and other essential civilian services.

Recent directive from the WPB provides for production of substantial number of FWD trucks in a wide variety of models and types, 2½ to 15 tons capacity; such trucks to be built only for essential civilian uses. FWD trucks built under this release will be available for purchase on and after January 1, 1945. Deliveries will be made in keeping with priority of orders as received; immediate action and prompt placing of orders is urgent to assure delivery before limit of production is reached.

Write—wire—or phone us directly, or the nearest authorized FWD dealer for full information and your eligibility to purchase under these new rationing regulations.

THE FOUR WHEEL DRIVE AUTO CO.
CLINTONVILLE, WISCONSIN
CANADIAN FACTORY: KITCHENER, ONTARIO

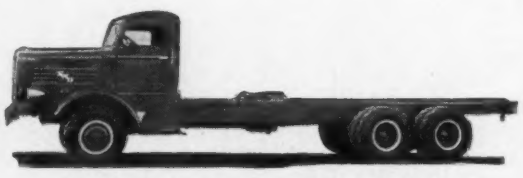
FWD TRUCKS



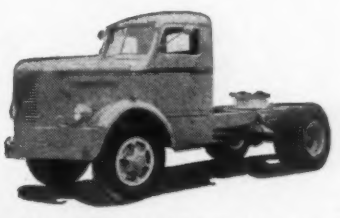
FWD's "H" series tractor trucks with four-wheel drive and gross vehicle weight ratings from 40,000 lbs. to 60,000 lbs. Powered with gasoline engines ranging from 100 to 120 horsepower on wheelbases from 120" to 144" in conventional or cab-over-engine types.

These and other FWD Trucks, 2½ to 15 tons capacity, available to qualified purchasers.

"U" series FWD's with gross vehicle weight capacities of 22,000 to 28,000 lbs. Powered with 125 h.p. gasoline engines, 5 speed transmission, 11:00x20 tires, wheelbase 150". Four wheel drive.



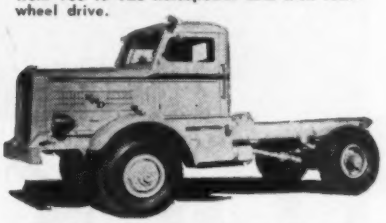
Six-wheel drive FWD trucks with gross vehicle weight capacities of 55,000 lbs. Powered with either gasoline or diesel engines of 150 and 200 horsepower. Wheelbase from 214½" to 276".



Straight trucks in FWD's "H" series range 17,000 to 20,000 lbs. gross vehicle weight capacity with wheelbases from 144" to 154" gasoline engine powered with power plants from 100 to 120 horsepower and with four-wheel drive.

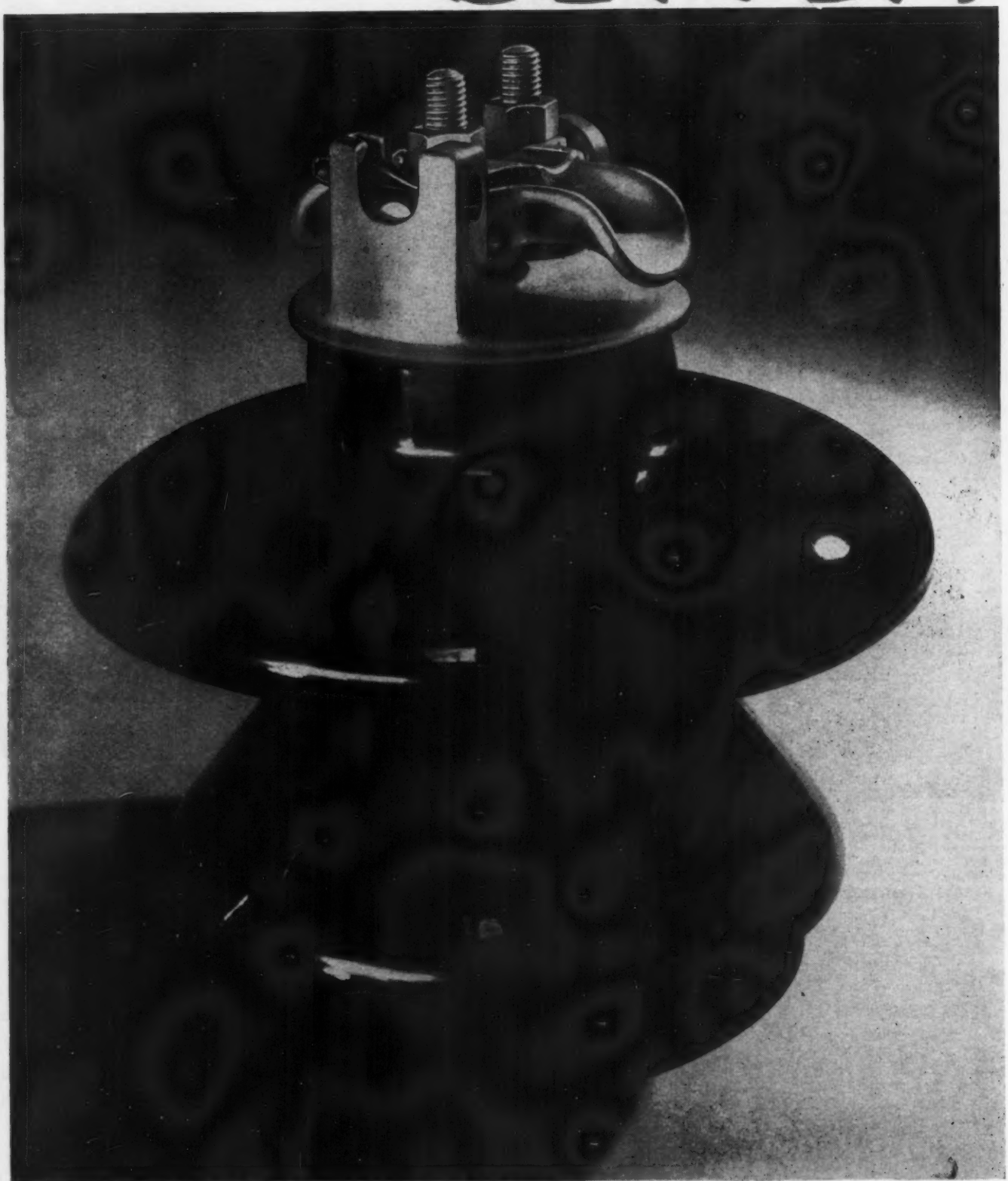
Utility Line Construction and Maintenance trucks by FWD with 5 and 7 man cabs, special power-take-offs and line bodies. Powered with 115 h.p. engine on 144" wheelbase with four-wheel drive, 5 speed transmission, 144" wheelbase and 9:00x20 tires.

FWD's four-wheel drive Road Maintainer — built for underbody scraper use with extra heavy frame and other features that make it the ideal unit for street and road maintenance. Engine 115 h.p. — 5 speed transmission — 8:25x20 dual tires.



"M" series FWD's powered with either gasoline or diesel engines ranging from 150 to 200 h.p. and with capacities ranging from 30,000 to 42,000 lbs. gross vehicle weight. Four wheel drive.

The BETTER



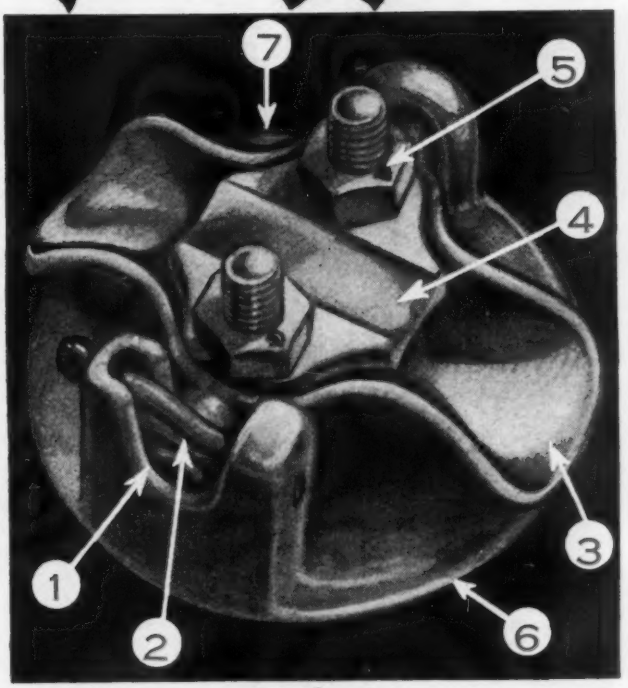
ORIGINATOR AND LARGEST MANUFACTURER OF WET-PROCESS PORCELAIN INSULATORS

LOCKE INSULATOR

FIRST IN CLAYRAMICS

Locke Clamp-Types

GIVE YOU THESE EXCLUSIVE ADVANTAGES



Eliminate Radio Interference

permanently. All metal parts are in initimate electrical contact at all times and under all conditions.

Conductors Are Protected

against burning. The heavy clamp mounting definitely keeps power arcs away from the easily damaged conductor.

No Loose Parts To Handle

in the air. The insulator minus the clamp is installed just as you would install any other pin type insulator. The clamp is attached loosely to the conductor on the ground. It is only necessary when installing the conductor to slide the clamp into its proper location, drop it into the mounting, drive home the cotter key and tighten the bolts.

No Special Tools

are required either to install or replace an insulator. Hot line maintenance is simple and fast using nothing but standard tools.

Other Valuable Features . . . .

1. High trunnion seat to permit maximum free clamp movement.
2. Heavy duty cotter key maintains electrical contact with the trunnion at all times. It cannot be completely removed, but is easily withdrawn to permit removal of clamp.
3. Wide, smooth bell mouth to eliminate conductor chafing.
4. Reversible keeper to accommodate maximum number of conductor sizes. Holds the conductor gently and firmly without danger of crystallization.
5. Special lock-nuts to prevent loosening of grip in service.
6. Overlapping cap protects cement joint from action of weather.
7. Smooth rounded edges to retard corona formation.

Only LOCKE clamp-types give you all these advantages

For nominal ratings from 34.5 KV to 69 KV, these better, time-saving units are available in either standard multipart or Hi-Top type.

Before you decide on the insulators for your next construction job, be sure to get all the details on Locke Clamp-Types.

FIFTY PROGRESSIVE YEARS OF SERVICE TO THE ELECTRICAL INDUSTRY

LOCKE INSULATOR CORPORATION BALTIMORE MARYLAND

FIRST IN CLAYRAMICS

Collyer ASBESTOS WIRE

Where it's HOT—or where corrosive vapors cut down the life span of ordinary insulation, Collyer Asbestos Wire eliminates annoying failures of electrical circuits. This wire, covered by a seamless coat of asbestos felt, impregnated with a special insulating and moisture-resisting compound, withstands conditions too severe for other types of insulation. Collyer Asbestos Wire is available . . NOW . . in many constructions for countless uses.

FOR THAT HOT PLACE

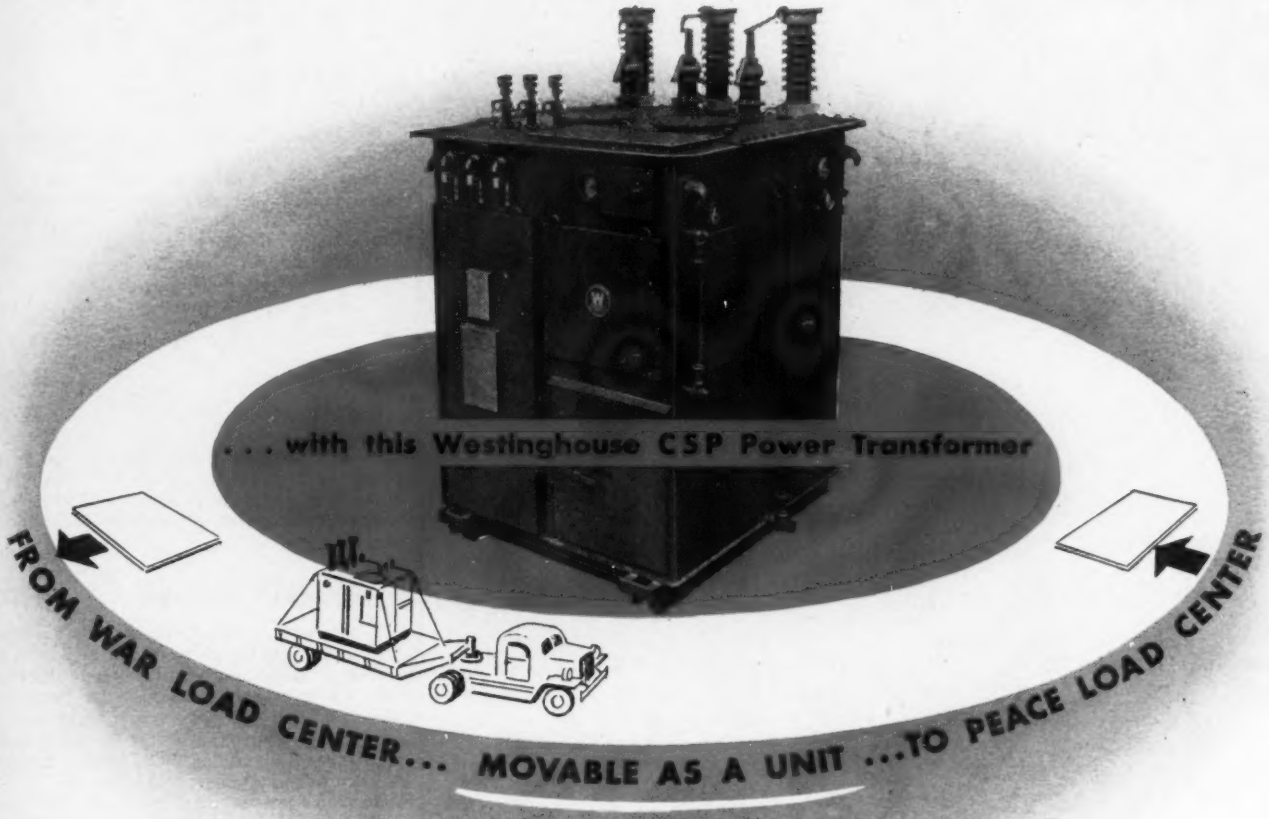
America's war needs still demand most of our production of other Collyer Wire but the day draws nearer when Collyer's complete line of high quality wiring will again be available.

For further information about Asbestos or other types of Collyer Wire, contact your local Collyer representative or write us direct.

COLLYER INSULATED WIRE CO., 255 ROOSEVELT AVE., PAWTUCKET, R. I.

WHEN PEACE COMES...

RECONVERSION IN HOURS



In a matter of hours, a CSP power transformer can be moved to a new load center. When the day of reconversion comes—just disconnect, roll onto a trailer-truck, take to a new platform, and reconnect.

Westinghouse CSP Power Transformers contain in *ONE UNIT*...

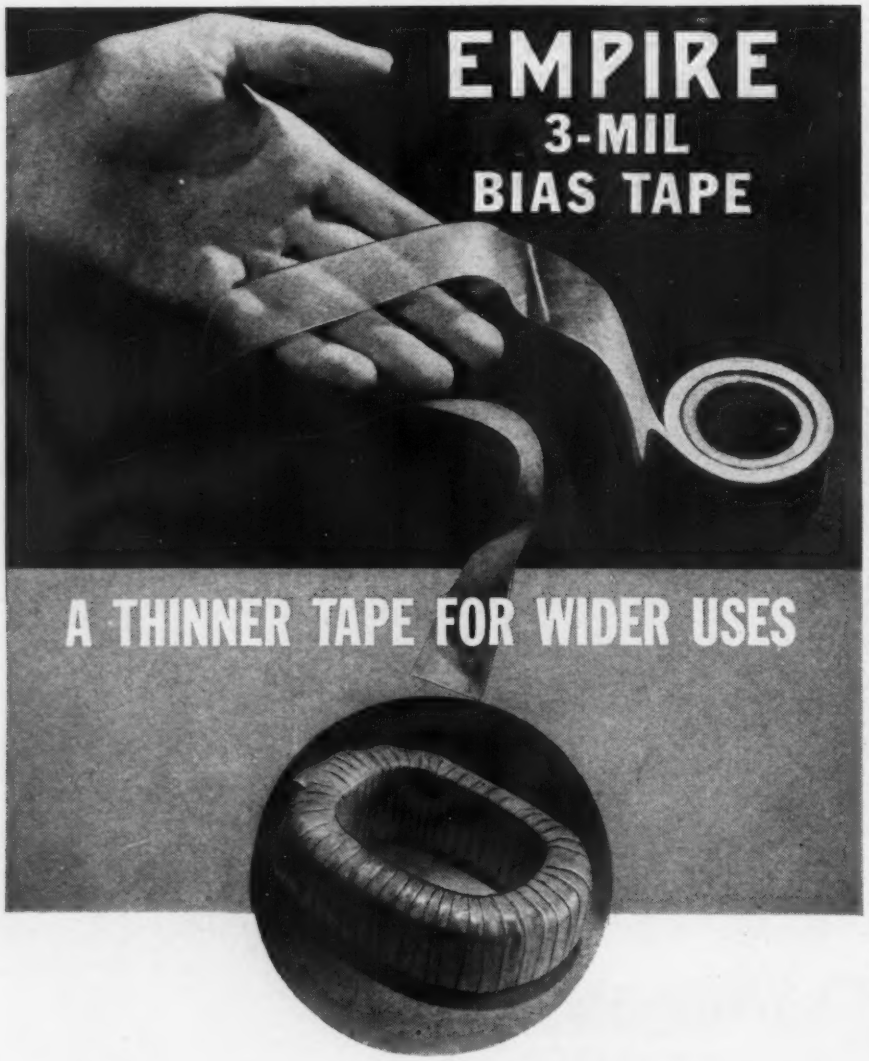
- transformer
- circuit breaker
- voltage regulator
- metering
- protection against —lightning
- protection against —overloads
- protection against —short circuits

Compare this with the time required to move a conventional single-feeder substation . . . with its 43 major components. The Westinghouse CSP power transformer makes reconversion easy and *economical.* It saves man-hours . . . permits practically 100% salvage of the war-load installation.

The Westinghouse CSP power transformer performs *all* the functions of a conventional single-feeder substation. It is completely self-protecting (CSP) against lightning, overload and short-circuit damage. For complete information, call your Westinghouse office or write Westinghouse Electric & Manufacturing Company, Dept. 7-N, East Pittsburgh, Pa. J-70430

Westinghouse PACKAGED POWER

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE



Made particularly for use on irregularly shaped conductors, the space-saving feature of the new EMPIRE 3-mil Bias Tape is finding immediate favor among designers and manufacturers who require uniformly high dielectric strength in tapes, without the encumbering bulkiness of ordinary wound insulations. 3-mil is especially suited for wrapping solenoid or small instrument coils, and may be wrapped helically without "coning."

A note or telephone call to our nearest sales office will bring a Mica representative with complete specifications and samples.

West Coast Sales Representatives

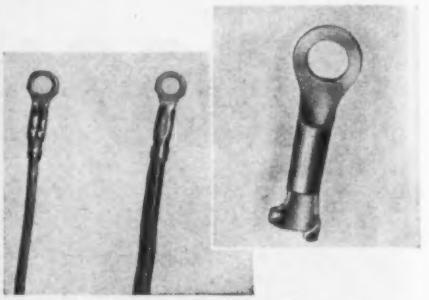
Triangle-Pacific Company

SAN FRANCISCO: 1045 Bryant Street • LOS ANGELES: 340 Azusa Street
SEATTLE: 95 Connecticut Street

Mica Insulator Company

200 VARICK STREET • NEW YORK 14, N. Y.

Terminal (1108)



H. B. Sherman Mfg. Co. has developed a solderless terminal, known as the "Uni-Crimp," for small wire connections. This new terminal is said to be interchangeable with other terminals of its type. It is made from copper, of one-piece construction with insulation support wings. Three styles are offered: for No. 18-, 20- and 22-gauge wire; No. 14, 16 and 18 gauge; and No. 10 and 12 gauge.

Expansion Fitting (1109)

O. Z. Electrical Mfg. Co. has a new expansion fitting for thin wall conduit. It is furnished with extension nipples already in place for installation on conduit sizes from ½ to 2 in. Special packing seals the head and prevents water or moisture from entering, it is stated.

Transformers (1110)

Power circuit transformers with resetting breakers in capacities from 100 to 750 watts are being manufactured by Jefferson Electric Co. These transformers may be furnished with "on" and "off" switch and receptacle in the wiring compartment for use with small appliances, it is stated. The circuit breaker is said to be tamper-proof. For 25- to 75-watt transformers, glass enclosed fuses are provided in place of cricuit breakers.

Balancing Reel (1111)

Appleton Electric Co. has a light-weight all cast balancing reel for supporting directly over production line portable tools and air and electrical devices weighing up to 10 lb. This reel has adjustable cable clamps which hold tools in position.

Switch Boxes (1112)

The Wiremold Co. has announced that all its switch and receptacle boxes are now provided with clearance holes for screws used in mounting Uniline, Despard and similar plates to the boxes.

How Roast No. 179 will help Frigidaire Dealers sell more and better Home Freezers

FREEZING, thawing, cooking, taste-testing—they're all parts of the extensive Frozen Food Research Program that Frigidaire has been conducting for more than two years. To improve present products . . . to develop new ones in the home freezer field . . . to develop more effective techniques for preparing food for freezing, for freezing food, for cooking frozen food . . . to further the popularity of frozen food storage—these are just a few of the reasons why Frigidaire is engaged in this great research program.

From continuing research like this are coming the product advantages and sales knowledge that will make it possible for Frigidaire Dealers to capture a major part of the big postwar home freezer market. Since 1942 alone, nearly 200 separate projects have been put "in work"—more than 2,600 individual tests made.

As a result of this intensive program, Frigidaire already has important answers to such basic questions as:

How should various foods—meats, vegetables, fruits, etc.—be prepared for freezing?

How should foods be wrapped, or what kind of containers used, for frozen storage?

What temperature is best for freezing foods? What temperature is best for storing frozen foods?

What varieties of fruits and vegetables are most satisfactory for storage in home freezers?

How does frozen storage compare with other food-preserving methods as to: Flavor? Appearance?

What features will make home freezers even more convenient and salable?

Frigidaire has answers to many important questions like these, is learning the answers to many more, as the result of constant experimentation in its own Home Economics Research Laboratory . . . field surveys among users and prospective users of all types of frozen storage equipment . . . cooperation with large food processors, universities, Government agencies, and others engaged in frozen food experimental work.

Frigidaire Dealers have already benefited from this research work. An authoritative instruction booklet, *How to Freeze and Store Foods*, and a practical Frozen Food Packaging Kit—both developed out of Frigidaire Research—have won Frigidaire Dealers valuable goodwill and recognition in the home freezer market.

But the greatest benefits of Frigidaire's present Frozen Food Storage Research are yet to come—when the findings of this program are translated into new and improved Home Freezers . . . and Selling Plans for Frigidaire Dealers!

Frozen Food Research: One more reason why the Frigidaire Franchise is prized so highly . . . one more evidence of how completely Frigidaire shares in General Motors' forward-looking policy of:

"Finding out what people LIKE —and doing MORE of it.

"Finding out what they DON'T LIKE —and doing LESS of it."

Listen to
GENERAL MOTORS SYMPHONY OF THE AIR
Every Sunday Afternoon, NBC Network

BUY AND KEEP MORE WAR BONDS

For Excellence in War Production
ARMY-NAVY "E" with Star and Wreath

FRIGIDAIRE
Division of
GENERAL MOTORS
DAYTON 1, OHIO • LEASIDE 12, ONTARIO
Peacetime builders of
ELECTRIC REFRIGERATORS • RANGES • WATER HEATERS
HOME FREEZERS • ICE CREAM CABINETS
COMMERCIAL REFRIGERATION • AIR CONDITIONERS
BEVERAGE, MILK, AND WATER COOLERS

THE LIGHTING INDUSTRY says •

So the GENERAL ELECTRIC lamp department has commissioned these additional Architects and Designers to work out Postwar Lighting Ideas

DONALD DESKEY

EDWIN H. SILVERMAN

ABRAHAM LEVY

THE JOBS	THE MEN	YOUR MARKET
Restaurant	Donald Deskey Donald Deskey Associates New York	153,000 Eating Places
Furniture Store	Edwin H. Silverman & Abraham Levy, Silverman & Levy, AIA Philadelphia	45,000 Furniture Stores
Florist Shop	Morris Ketchum, Jr. Ketchum, Gina and Sharp New York	16,000 Florist Shops
Large General Office	Louis E. McAllister Philadelphia	600,000,000 sq. ft. of Offices and Warehouse space
Group of Private Offices	J. Gordon Carr New York	
Service Station with Retail Shop	George Cooper Rudolph George Cooper Rudolph Asso. New York	197,000 Gas Stations 66,000 Garages

KEEP BUYING WAR BONDS

GENERAL ELECTRIC

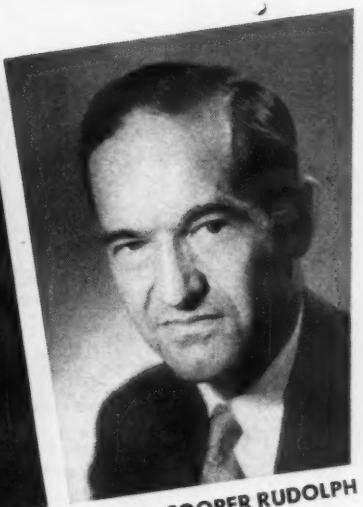
Hear the General Electric radio programs: "The G-E All-Girl Orchestra",

"...MORE!"

MORRIS KETCHUM, JR.

LOUIS E. McALLISTER

J. GORDON CARR



GEORGE COOPER RUDOLPH

WHAT will postwar lighting be like? Early this year, the General Electric Lamp Department announced the commissioning of ten outstanding architects and designers to create new lighting ideas and fixtures suggestions for postwar stores, offices and homes.

Now, as a result of hundreds of favorable comments from members of the lighting industry, fixture manufacturers, architects and designers, General Electric has expanded its program by commissioning several more of the nation's best architects and designers . . . and still more will be announced later.

Each project has been assigned to a recognized authority in the field. And a glance at the opposite page will show you that each represents a large and profitable market that will be ready for immediate development as soon as materials are made available for remodeling and new construction.

Fixture manufacturers already are at work on new fixtures that incorporate design effects suggested in the first ten commissions. The results of the six additional jobs announced here likewise will be turned over to them for development.

The many comments already received, and the thousands of requests for booklets describing the projects, indicate that these postwar lighting ideas already are proving their merit to architects, designers, manufacturers of lighting equipment, to those who sell lighting, and those who use it.

Booklets now are available describing seven of the first ten commissions —two food stores, a drug store, two homes and two department stores. Others soon to be published include an office, a women's specialty store and a home.

Results of the six new commissions announced on these pages will be made available in the same way.

Please write to Div. 166-ET-K, Nela Park, Cleveland 12, Ohio, if you would like a free copy of each booklet already published, or if you would like copies of the others when they are made available.

"TO MAKE G-E LAMPS
STAY BRIGHTER LONGER"
the constant aim of G-E Lamp Research

KEEP THE WAR BONDS YOU BUY

G-E MAZDA LAMPS

Sunday 10 p. m. EWT, NBC; "The World Today" news, every weekday 6:45 p. m. EWT, CBS.

FOR LASTING, DEPENDABLE SERVICE...

rely on these 6 advantages of Transite Ducts

Inorganic . . . made of an asbestos and cement composition compressed under great pressure. This provides permanence and strength. These ducts are also immune to rust and rot.

Permanently smooth bore . . . long cable pulls and replacements are made easier. Danger of damage to cables is minimized.

Easily and quickly installed . . . long, light-weight lengths and simple assembly method assure rapid, economical installation.

Immune to electrolysis . . . being entirely inorganic and non-metallic, these ducts are not affected by electrolysis or galvanic action.

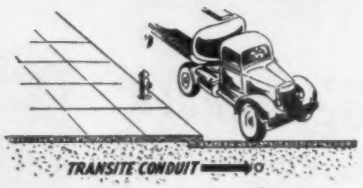
Lower cable temperatures . . . an advantage resulting from a relatively high rate of heat dissipation.

Incombustible . . . won't contribute to the formation of dangerous smoke, gases, or fumes. If burnouts do occur, these inorganic ducts provide maximum protection to adjacent cables and permit easy removal of damaged conductor.

For complete details on Transite Ducts, write for Data Book, DS-410, Johns-Manville, 22 East 40th Street, New York 16, N. Y.

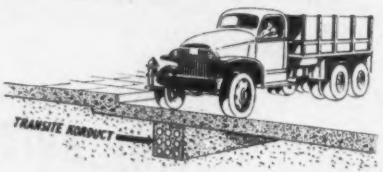
JOHNS-MANVILLE TRANSITE DUCTS

TRANSITE CONDUIT



Designed for exposed work and for use underground without a concrete encasement.

TRANSITE KORDUCT



For use in concrete. Thinner walled, otherwise identical with Transite Conduit.

We knew we had a great insulated wire when we made Laytex. But, frankly, even we never expected any single wire to take all that Laytex has taken in the world-wide laboratory of war.

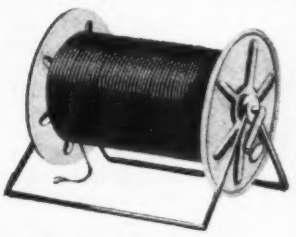
Laytex has been subject to the moisture, heat and humidity of the tropics . . . the cold of the arctic circle. It has been subject to the shattering shock of the guns on our biggest dreadnaughts.

Laytex has a proven record of delivering more electricity, more dependably, in more different jobs than any other wire we know.

Right now the entire output of Laytex Wires and Cables is going to the Armed Forces. But the day is steadily drawing nearer when manufacture will be resumed for Buildings, Police and Fire Alarms, Communications, Signalling, Power, Control, and other exacting services.

SERVING THROUGH SCIENCE TO PIONEER A NEW ELECTRICAL ERA

RUBBER INSULATION AT ITS BEST



U.S. Laytex

Reg. U. S. Trade Mark

WIRES AND CABLES

UNITED STATES RUBBER COMPANY

1230 SIXTH AVENUE • ROCKEFELLER CENTER • NEW YORK 20, N. Y. • *In Canada:* DOMINION RUBBER CO., LTD.

Record Breaking Orders *Prove Trade Acceptance*

Lloyd New *Automatic* Starter

In the *New* RED PLASTIC Can

Listed and Approved by Underwriters' Lab. Inc.

Submitted to Electrical Testing Laboratories, Inc., for certification.

Pat. Nos. 2200443—2228210

Locks Out . . . Resets AUTOMATICALLY

1. Positively cuts out deactivated, flickering, blinking lamps.
2. When trouble is detected the starter automatically cuts off current to the ballast and lamp.
3. Gives long life to ballast because defective lamp is locked out. Prevents overheating.
4. When Lloyd AUTOMATIC locks out defective lamp—turn off the current—Remove defective lamp—Put in a new lamp.
   Allow at least one minute to make the above change of lamps. Turn on the current. The starter automatically lights the new lamp.
   NO NEED TO DO ANYTHING TO THE STARTER
5. Lloyd NEW PLASTIC CAN has higher dielectric strength, is stronger, lighter, distinctive.
6. Knurled rim on plastic can insures positive grip for insertion and removal of starter.
7. Plastic can is sealed. No projecting lugs to cause trouble.
8. The life of the AUTOMATIC starter is many times greater than that of the average lamp.
9. It saves maintenance costs and power consumption, protects and insures longer life to the ballast and lamp.
10. Tested in production and prior to shipment to insure perfect performance.

LLOYD PRODUCTS COMPANY

*Dept. EW-11 Providence 5, R. I.

Representatives in 23 Leading Cities.
Export Office: 13 E. 40th St., N. Y. C.

Armature Winder (1113)

A multi-polar armature winding machine has been developed by the Cleveland Electrical Equipment Co., according to a recent announcement. This winder may be adapted for bi-polar and for a-c field winding, it is stated. It may be secured in different sizes for various purposes.

Circuit Breaker (1114)

A circuit breaker which it claims is relatively free from effects of extreme temperatures has been announced by Littelfuse, Inc. The actual trip temperature of the breaker without flow of current is said to be 350° F. ambient temperature. In the new design, bi-metal is used as the finger that pulls the trigger and no appreciable mechanical load is exerted on the bi-metal as it trips the breaker, according to the announcement. The range is 5 to 50 amp. at 32 volts a-c or d-c.

Tool (1115)

Burndy Engineering Co. has announced manufacture of a new tool for simplifying installation of its Hyseal thimbles. The new tool is said to eliminate necessity of a separate pair of dies for each thimble size as

required in hydraulic presses. The "spade" of this new tool carries a series of holes or dies, which provide for installation of a number of thimble sizes. Two sizes are available.

Fixture Hanger (1116)

Day-Brite Lighting, Inc., has designed a triple-purpose industrial fixture hanger, which it claims provides an outlet box cover with a receptacle, a means of supporting chain suspension fixtures and a grounding arrangement to permit use of fixtures with two-wire cord and plug sets. This hanger fits any standard 4- or 3¼-in. outlet box or open type plaster ring. It is known as the "Hydee" hanger.

Here is PRACTICAL Postwar Planning

Ask your Hotpoint distributor to show you this material—planned for Hotpoint dealers to help them make the most of their postwar markets. It's sure-fire, it's timely right now and it's mighty important to you.

HERE ARE SOME SUBJECTS COVERED

Your Hotpoint distributor will gladly show you the presentation pictured at right covering, among other things, these important subjects:

1. How big will the building boom be? Estimates by leading authorities concerning the great number of postwar homes. What this can mean to you as a Hotpoint dealer.
2. How many old homes will be modernized? Another great boom for Hotpoint—and for you.
3. The great replacement market—for appliances now wearing out by the hundreds of thousands.
4. Why people will be *able* to buy—"pent-up" purchasing power estimated at over 100 billion dollars.
5. Why 77% of new homes will be in price range for Hotpoint Kitchens.
6. What Hotpoint has done and *is doing* to help you take advantage of the greatest building and modernizing boom in a lifetime—preselling your prospects.
7. How Hotpoint helps you specifically. Promotion helps. Copies of "Your Next Kitchen" by Hotpoint—the practical Kitchen Planning Guide being made available to your prospects. 300,000 copies have already been requested!

DON'T WAIT. NOW IS THE TIME!

Get in touch with your Hotpoint distributor, who will gladly present full details about this helpful program. Or mail the coupon to us and we will see that you get full information.

Edison General Electric Appliance Company, Inc.
5612 West Taylor Street, Chicago 44, Illinois

BETTER CARE — LESS REPAIR

Ask your Hotpoint distributor to show you this presentation and this Kitchen Planning Guide—or mail the coupon below.

ARMY E NAVY

Edison General Electric Appliance Company, Inc.
5612 West Taylor Street, Chicago 44, Illinois

I want all the tools I can get to take advantage of America's Biggest Appliance Boom. Please send full details.

*Name*_____ *Title*_____

*Firm*_____

*Street*_____

*City and State*_____

ELECTRIC **Hotpoint** KITCHENS

REFRIGERATORS · RANGES · WATER HEATERS · WASHERS AND IRONERS · CLOTHES DRYERS · AUTOMATIC DISHWASHERS · ELECTRASINK · STEEL CABINETS

Take a Load

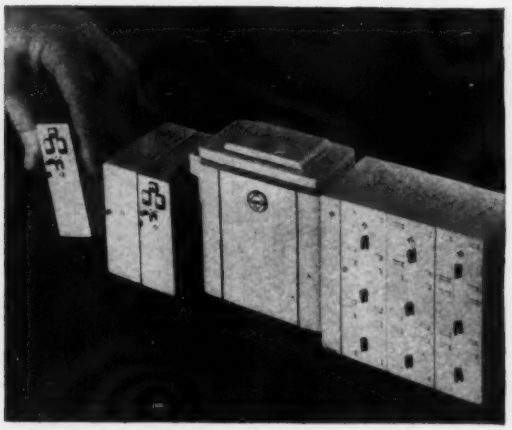
NEXT

ALLIS

off Your Mind

TIME YOU PLAN UNIT SUBS!

See how headaches disappear as you work out power distribution problems with Allis-Chalmers' new "Unit Sub Builder" Set! It's no toy, no stunt... but an *engineered* time- and trouble-saver!



1 **YOU SEE WHAT'S AVAILABLE** — without bogging down in charts, tables, catalogs. For a demonstration of the new unit sub models by an A-C field engineer, call your nearby Allis-Chalmers office. No obligation, of course.

2 **YOU EXPERIMENT**—Unit sub arrangements are assembled quickly. . . allowing easy comparison of alternate plans. You'll find models idea-stimulating.

3 **NEW SLIDE RULE** for figuring breaker interrupting capacities will save you time, trouble.

4 **YOU VISUALIZE SOLUTIONS** to your distribution problems *on the top of your desk.* You see what space the right unit sub will occupy, how it will actually look.

5 **HANDY "CHECK LIST"** provides a *double* check. Allis-Chalmers, Milwaukee, Wisconsin.

♪ *Tune in the Boston Symphony, Blue Network, every Sat. Eve.*

A 1748

SEE YOUR UNIT SUB IDEAS WORKED OUT WITH

IS-CHALMERS *"Unit Sub Builder" Set*

GET RID OF THE Sacred Cow IN WIRING!
In electrical wiring of buildings, the costly custom of using No. 14 has blocked progress toward adequate wiring like the sacred cow on an Indian road. The Hindu, you recall, reveres the cow and will not disturb it, regardless of time or place. But, if our buildings of tomorrow are to have proper wiring, then sacred cows like No. 14 must yield to progress.
A first and basic step towards realization of the adequately wired building should be insistence that the sacred cow of No. 14 must go. Its anemic circuits have deprived many a building of full use of available power. To take full advantage of the electrical world of tomorrow, wiring must be planned with an eye to the future for the greater use of electrical equipment. The Okonite Company, Passaic, N. J
OKONITE and HAZARD
insulated wires and cables
To wire a building adequately, no smaller wire than No. 12 should be specified. Only one size larger, it will carry one third more current, reduce voltage drop by more than a third, deliver more power for your money and yet requires no larger conduit or fittings.
ADEQUATE WIRING THE KEY TO INCREASED PRODUCTION
3624

MEMO:
to my
SECTY
3
"TELL
ALL
POWER
SALES-
MEN
to push
this
that
HARD
It's
GOOD
for us
AND
GOOD
for the
PLANT
OWNER"

You Save it IF IT'S A SERVIT

(Reg. Trade-mark)

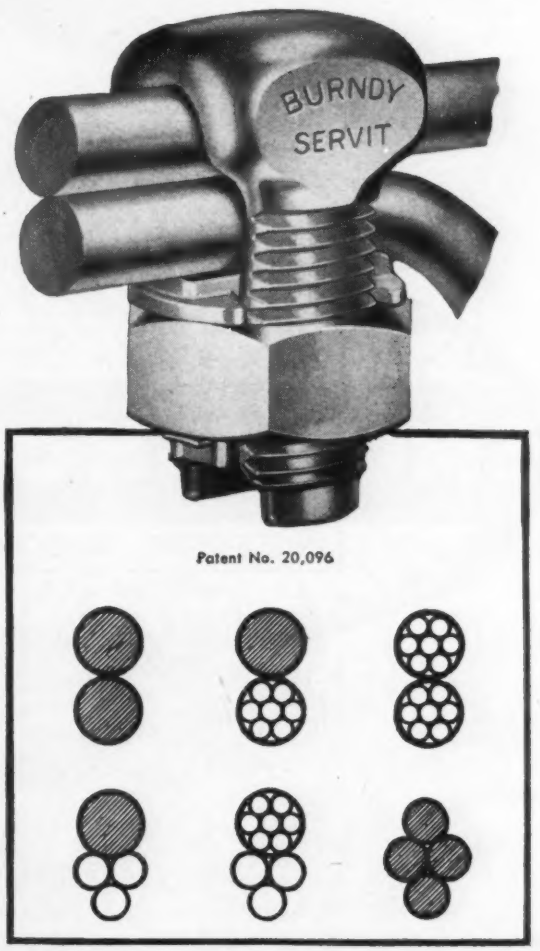
This FORGED Burndy service connector can be used over and over again!

"We use the SERVIT because it has far higher salvage value," recently stated a prominent utility EE in discussing service connectors.

This advantage of *high reuseability* can only be obtained from a connector which possesses unusually high strength *... and the SERVIT has that in abundance.* Skillfully forged, from special high-strength alloys, it permits high compression between conductors, yet, withstands wrench torque, without distortion, *time and again!*

To be sure of obtaining the high salvage value, *lower costs,* which this forged Burndy connector provides, be sure to specify SERVIT for all service connections. Literature on these, and other Burndy connectors, gladly sent on request. Burndy Engineering Co., 107 Bruckner Boulevard, New York 54, N. Y.

IN CANADA: Canadian Line Materials, Limited, Toronto 13



Headquarters for CONNECTORS

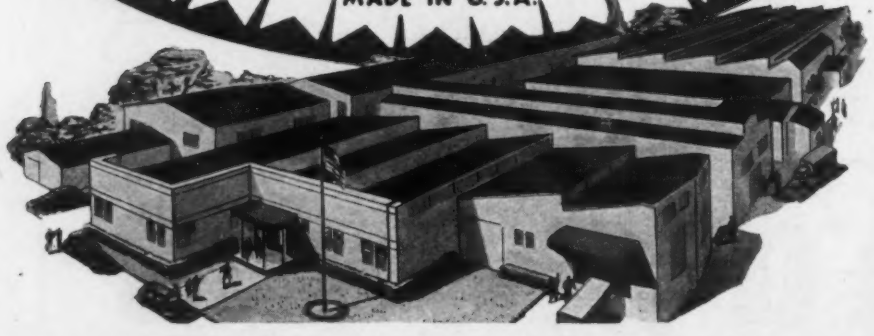
Burndy

SMOOT-HOLMAN COMPANY
SMOOT-HOLMAN
INGLEWOOD, CALIFORNIA

HALL-MARK OF QUALITY

Smoot-Holman Company takes great pride in the quality of the products which bear this well-known hall-mark. With only a limited amount of material available and with skilled labor difficult to find, we have preferred *not* to make a product when lack of manpower or materials would interfere with our standards of excellence. The Smoot-Holman label on any lighting fixture means it has been *tested* and *certified* by America's foremost testing laboratories, your assurance of highest quality.

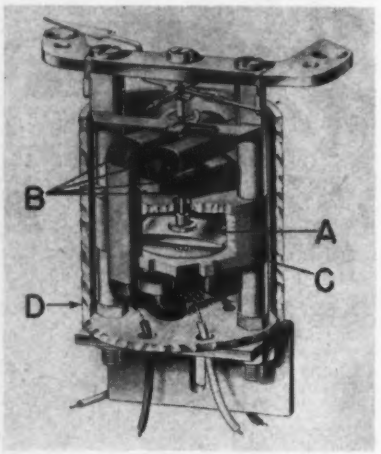
SMOOT-HOLMAN COMPANY
SMOOT-HOLMAN
INGLEWOOD, CALIFORNIA
MADE IN U.S.A.



Offices in Principal Western Cities—Branch and Warehouse in San Francisco

Ratio Meter (1117)

Thomas A. Edison, Inc., instrument division, has designed an electrical ratio meter, which it claims has a movement which may be adapted to any service in which it is desired to indicate the ratio between the values of two currents or voltages, independently of their magnitude. The design inverts the conventional arrangement by using a small moving permanent magnet vane, position of which is governed by the



ratio of the currents in two sets of stationary actuating coils placed at an angle with one another.

Principal use of the instrument so far has been in connection with a temperature sensitive resistance bulb to indicate temperatures at various critical points about aircraft, but other applications are being developed, according to the announcement. Put into production a few years ago, this meter until recently has been made exclusively for the Army and Navy.

Coil resistances up to 1,000 ohms. are feasible and the instrument will operate dependably at currents down to 300 microamperes, it is claimed. The scale span ordinarily covers 120 circular degrees.

Packing (1118)

A new type of flexible metallic packing, which it claims is capable of withstanding temperatures up to 2,000°F. and is highly resistant to corrosive gases, alkalies and most acids, has been developed by Johns-Manville. The material, which is called Inconel, was designed to meet exacting conditions existing in the exhaust systems of airplane engines equipped with turbo superchargers, according to the announcement.

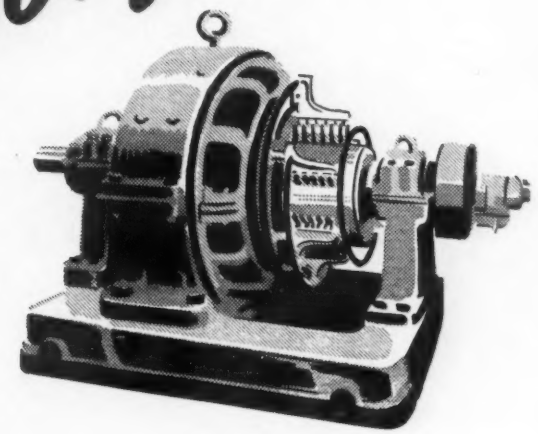
The material is made of a nickel-chromium-iron alloy in wire form, knitted into mesh and then braided. In addition to its high corrosion and temperature resistance, the material is said to be strong, resilient, non-scaling and non-magnetic. It is available in several styles, including square section packing in coil and tape forms, from which ring type gaskets may be formed. One style is made with asbestos fibres interwoven with the metallic alloy and serving as a sealing agent.

Wire Marker (1119)

A tab type wire marker of vinylite plastic is being manufactured by the William Brand Co. This new marker consists of a sleeve which fits around the wire and an apron, or tab, on which the designation is printed.

Saved from the scrap pile... by wartime necessity ...this wrecked motor was completely rebuilt and back on the production job in short order.

Wrecked-but NOT junked



An open field circuit caused a runaway . . . bearing pedestals snapped . . . stator and armature were wrecked on this steel mill edger drive motor.

It would take months to get a new 250 hp—230-volt, variable speed—d-c motor. What was to be done?

Instead of scrapping this motor, it was rebuilt in a Westinghouse *Manufacturing and Repair** Plant. To meet the emergency, three shifts worked 24 hours per day—completed the job in 21 days.

To keep production rolling, Westinghouse M & R Plants are called upon for every kind of electrical repair service. Each M & R Plant is a link in a nation-wide chain—with a local service branch as close as your telephone. Factory-trained men, using factory methods and equipment, are ready to give your electrical equipment complete, dependable repairs.

J-90552

TUNE IN JOHN CHARLES THOMAS • SUNDAY 2:30 EWT., N.B.C. • HEAR TED MALONE • MON. WED. FRI., 10:15 EWT., BLUE NETWORK

When vital electrical equipment needs repair... phone the nearest office of Westinghouse Electric and Manufacturing Company for

Westinghouse

COMPLETE REPAIR SERVICE

*33 M & R PLANTS • • ONE NEAR YOU

FOLLOW UNIVERSAL'S FORWARD MARCH TO MARKET

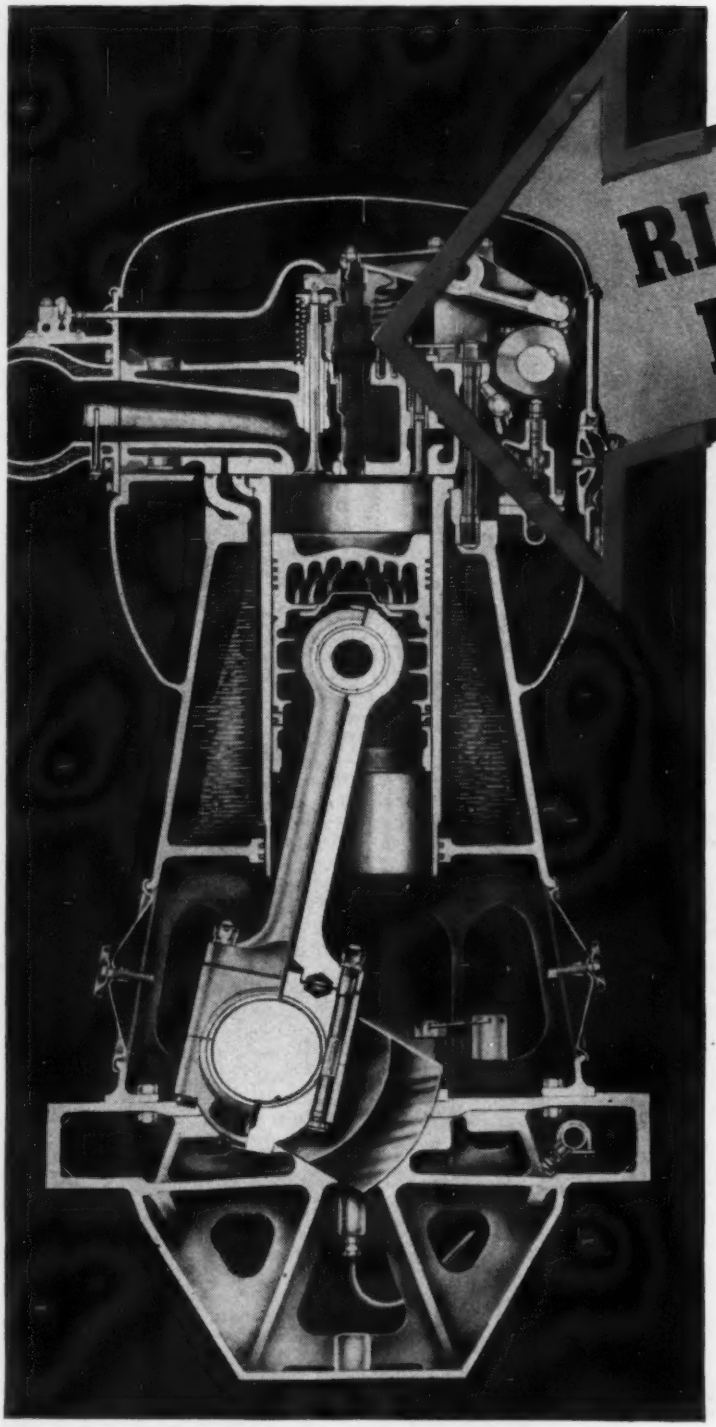
The "U" Plan for "V" Day inaugurated over a year ago was the first indication of Universal's forward march to market. Full page color advertisements are now running in 14 national magazines delivering more than 40 million "U" Plan messages to consumers. Over 16,000 dealers are taking advantage of the "U" Plan Local Promotion Program and its supplementary services such as the "100 Letter Plan," the "Dealer's Digest," Store Planning, Planned Selling and Sales Training.

Universal's Own Planning for "V" Day

While offering dealers a systematic, down-to-earth post-war plan, Universal has also been busy putting its own house in order. Personnel and physical plant facilities in every department have come in for careful consideration. New products have been added to Universal lines—old models have been eliminated. Universal housewares and appliances have been completely redesigned for post-war production.

Ask your nearest Universal Distributor for a presentation of "FORWARD MARCH TO MARKET"*—the fascinating story of Universal's preparation for post-war appliance selling. Find out how you can secure the valuable Universal franchise in your community.*

Universal Electric Appliances Distributed in Canada Exclusively by Northern Electric Company, Ltd.



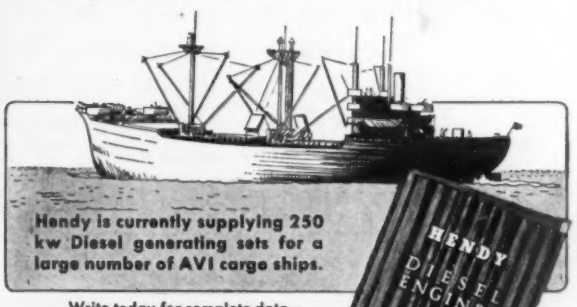
RIGHT WHERE IT BELONGS!

The unit-type fuel injector in Hendy Diesel Engines is right in the head...*logically* placed for satisfactory service under all load conditions, with *uniform* high-pressure fuel charge to *each* cylinder. This injection system provides individual fuel pumps for each cylinder...does away with long, high-pressure fuel lines... simplifies service because the entire unit can be easily removed for cleaning.

In addition to the unit-type fuel injector you'll find other important features too, such as...overhead camshaft, direct actuated dual intake and exhaust valves, and hydraulic tappets. All these features, *combined for the first time in a single engine,* reduce the number of wear points, simplify service and contribute directly to the lower maintenance costs a successful Diesel operator must have.

In marine service—or for stationary duty—Hendy Diesels can serve you well. They combine two great qualities...all the ruggedness for rough seas; all the good features for low-cost operation.

Hendy Diesels for marine or industrial service... 6 or 8 cylinders, 350 to 675 hp... are also available with Hendy generators as complete electric generating plants.



Hendy is currently supplying 250 kw Diesel generating sets for a large number of AVI cargo ships.

Write today for complete data—ask for the New Hendy Series 50 Diesel Engine Catalog.

JOSHUA HENDY IRON WORKS

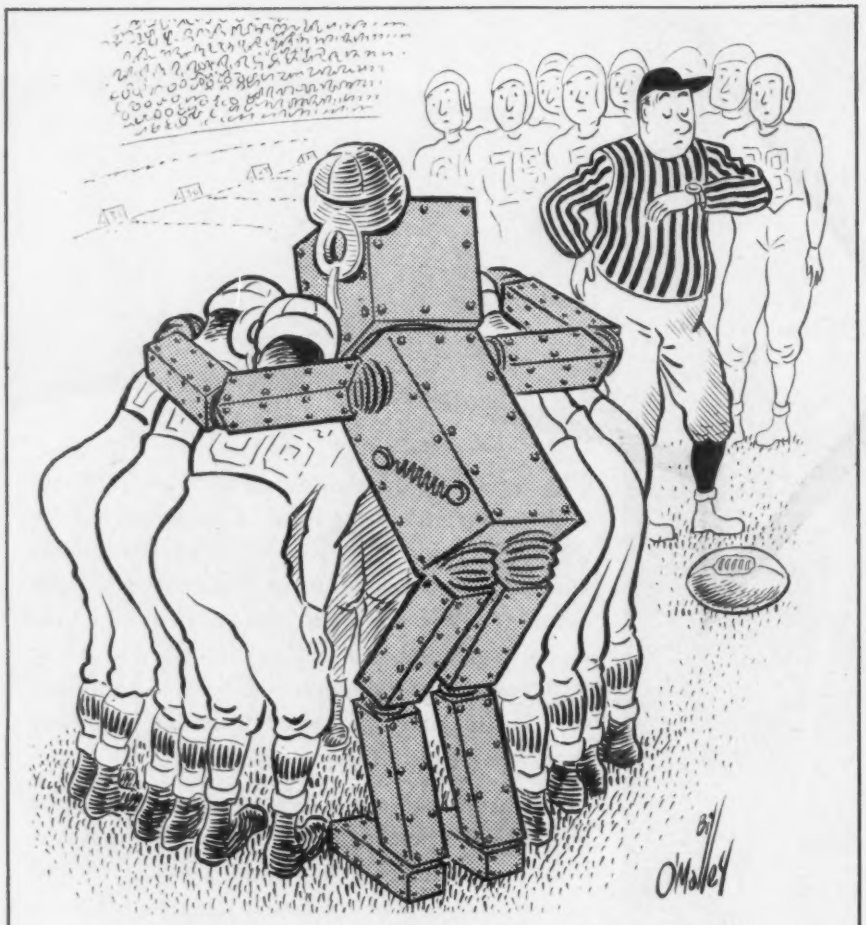
ESTABLISHED 1856

SUNNYVALE, CALIFORNIA

Manufacturing Plants: SUNNYVALE, POMONA and TORRANCE in CALIFORNIA • AMPERE, NEW JERSEY • ST. LOUIS, MISSOURI

51-D-8

Branch Offices: BOSTON • BUFFALO • CHICAGO • CINCINNATI • CLEVELAND • DETROIT • HOUSTON • LOS ANGELES • NEW YORK • PHILADELPHIA • PITTSBURGH • SAN FRANCISCO • ST. LOUIS • WASHINGTON



"A SMART PLAY, MEN, IS TO GET ALL YOUR PARTS FROM THE LEO J. MEYBERG CO."

There's no need for a Meyberg team to go into a huddle when you set up the play for us. Just give us the signal—and we'll carry the ball. We've got the broadest range of electric and electronic merchandise available of any distributor in the West. Lots of it we can deliver quickly—right out of stock. If not, we can get it through a quick double pass from our manufacturer, to us to you.

And just to round out the picture, we're equipped to do a completely engineered job on:

1. **Industrial Public Address Systems**
2. **Near Infra-Red Installations**
3. **Industrial and Store Lighting Installations**

Give us an opportunity to score for your firm—Save Time, Call Meyberg First!

LEO J. MEYBERG CO.

Incorporated

70 Tenth St., SAN FRANCISCO, 1 TELEPHONE UN 1212

2027 S. Figueroa St., LOS ANGELES, 7 TELEPHONE PR 6011

MOST COMPREHENSIVE INDUSTRIAL ELECTRIC AND ELECTRONIC STOCKS IN THE WEST

Circuit Breaker (1120)

Heinemann Circuit Breaker Co. has announced an improved model single-pole circuit breaker for 240 volt a-c and 125 volt d-c, 50 amp. maximum. This unit may be front or rear connected; has instantaneous trip or a selection of three time delays. Overall dimensions are 5¼ in. long, 2 11/16 in. high, 1½ in. wide.

Slimline F Lamp (1121)

General Electric Co. Lamp Department now has a new line of instant starting, hot cathode fluorescent lamps which can be operated at either 100 or 200 ma. to produce 60 lumens per watt (the highest efficiency yet developed) in tubes of T6 or ¾-in. diameter 3½ and 5 ft. long and T8 or 1-in. diameter 6 and 8 ft. long, single pin base. At the beginning white will be the only color furnished. Life rating, at 200 ma. operation, is about that of 40-watt F lamp, from 2,500 to 6,000 hours, depending on frequency of turning on and off. They are suitable for operation either singly or in multiple with ballasts or in series circuits with a high-frequency transformer. No starters will be required. A limited number or samples for design purposes will be available in December and soon thereafter. Information regarding ballasts and sockets may be obtained from normal channels for this type of equipment.

Pipe Fittings (1122)

Delta-Star has announced the Uniclamp line of drop forged pipe fittings, made in sizes up to 2 inches IPS. According to the company, there are no special fittings to order for tees, elbows, braces, angle fittings, etc., since any one of more than 80 different type fittings may be assembled from a stock of five unit type parts.

Welding Carbons (1123)

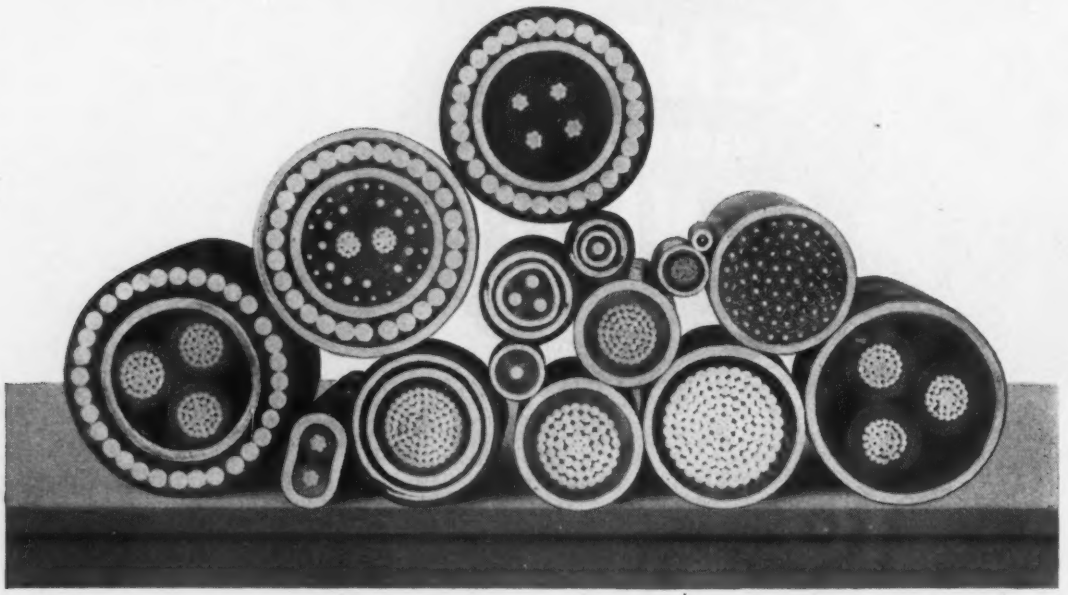
Stackpole Carbon Co. announces that a new treatment has resulted in longer life at high temperatures for its line of resistance welding or brazing carbons. The new treatment also is said to reduce by at least two-thirds need for frequent dressing. The new units are available in all shapes and sizes, according to the announcement.

Timer (1124)

A Weltronic Universal timer featuring interchangeable plug-in type control panels permitting quick conversion of resistance welders to any of the NEMA timing types has been announced by the company. The unit is adaptable for 115,- 230, 575- or 460-volt, 50/60 a-c service by shifting one jumper, it is stated.

CENTRAL
RIGID STEEL
CONDUIT
CENLACO (HOT DIPPED)
CENTRAL BLACK
"There's Tested Strength in Every Length"
SPANG-CHALFANT
Division of The National Supply Company
Executive Offices: Grant Building, Pittsburgh, Pa.
District Offices and Sales Representatives in Principal Cities

The Success of Your Post-War Plans May Depend Upon Electric Cables



From among the many types of Simplex insulated wires and cables we would like to help you select the one most likely to give you efficient, economical service in carrying out your post-war plans. If cables of special design are necessary to meet your particular requirements our cable engineers, who have specialized for many years in unusual cables for unusual service, will be pleased to cooperate with you in getting exactly the wire or cable you need.

SIMPLEX TRADE NAMES ARE A GUIDE TO SIMPLEX QUALITY*

ANHYDREX underground or submarine cables with water resistant insulation that needs no further protection from moisture.

CONDEX parkway or underground cables with flexible, interlocking steel armor.

FIBREX abrasion-resistant tree cables for power line installation among trees or where chafing may occur.

LATOX small diameter communication or control cables with conductor insulation made from liquid latex.

PLASTEX wires and cables with low voltage plastic insulation.

SIMCORE building wire to meet National Board of Fire Underwriters' requirements.

TIREX flexible, rubber-sheathed cords and cables for portable electric machine tools and appliances.

TELEX underground telephone wire for rural installations without conduits.

SIMPLEX:

Signal cables for railways and police or fire department signal service.

Service cables for overhead, service entrance or service drop.

Lead covered cables for underground distribution with conduit.

Steel taped underground cables for distribution without conduit.

Power cables with impregnated paper or varnished cambric insulation.

*Buna S has replaced natural rubber in all Simplex rubber insulations.

Simplex Wire & Cable Co., 79 Sidney Street, Cambridge 39, Mass.

Simplex WIRES and CABLES

390 Fourth St., San Francisco, Calif.

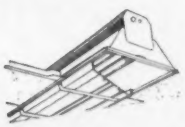
PACIFIC COAST OFFICES
910 East Third St., Los Angeles, Calif.

503 Pelson Bldg. Seattle, Wash.

Miller Troffers even solve some *old* ones!

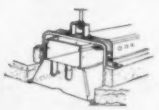
In the fluorescent lighting of schools, stores, offices and industry . . .

Better *lighting* is only one reason for using the Miller 2-lamp 40-watt Fluorescent Troffer. It is also designed to be the most *practicable* fixture to plan *around*—and build *with*.



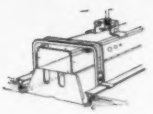
Troffer in position in either plaster or acoustic tile ceiling.

The patented Miller Troffer makes it possible to hang this lighting fixture from the structural ceiling—and then hang the false ceiling *from the lighting fixture!* Here's how it works in a ceiling with wood furring:



Bracket for wood ceiling.

This effects economies, assures stronger construction and adds flexibility to the entire installation. And it's just as easy to do with a ceiling using metal furring.



Bracket for metal ceiling.

In fact, so versatile is the Miller 2-lamp Troffer—in single units, unit combinations, or in continuous lightstrips "by the mile"—that its applications are practically as unlimited as the architect's ingenuity.

Other exclusive Miller features, developed in our 100 years of pioneering, include continuous wireway channels (just like in the Miller industrial 50 and 100 foot Candlers), hinged cover doors with plastic or glass dishes, ribbed or fluted—or prismatic glass plates—or grills of metal or plastic. These help make the Miller Troffer simple to service and so economical to operate that completely new standards of illumination become feasible.

We may seem to claim much—but we work with all light-sources (including mercury-vapor and incandescent), so our judgment is unbiased. So call in a Miller Engineer—they're in principal cities—or call us directly—and see why The Miller Company is starting its *second* hundred years, still in the lead!

THE MILLER COMPANY • MERIDEN, CONNECTICUT

ILLUMINATING DIVISION
Fluorescent, Incandescent
Mercury Lighting Equipment

OIL GOODS DIVISION
Domestic Oil Burners
and Liquid Fuel Devices

ROLLING MILL DIVISION
Phosphor Bronze and Brass
in Sheets, Strips and Rolls

WAR CONTRACTS DIVISION
War Materiel

MILLER
SINCE 1844

How much postwar power

will the Farmer use?

There's little doubt that power consumption on the farm is due for a big jump after the war.

Over 86% of farm families interviewed in a recent survey indicated that they had decided to buy some sort of electrical equipment. High up on the list of desired appliances were steady power users—refrigerators, washing machines, electric pumps, food freezers. *And more than half of these families showed definite preference for electrical cooking!*

Outside of the home, too, electricity will be harnessed to do many farm chores. Electric water systems, brooders, milkers, silo fillers, and hay hoists will be introduced to cut down labor costs, make farming more productive and profitable.

A wider market, too

These figures were gathered from farms already connected to the power lines. But what of the 3½ million non-electrified farms?

Many farmers will find in wartime savings their first opportunity to take advantage of near-by power lines. The Rural Electrification Administration considers it likely that between 200,000 and 300,000 farms will become electrified each year after the war.

Building a bigger power load

A well-equipped farm uses, on the average, 30% more power than an urban consumer. It is not uncommon for really productive farms to pay anywhere up to $400 a year for electric service.

In order for this important market to expand, the farmer must be convinced of the profit-making, laborsaving, timesaving possibilities of electricity on the farm. This must be done before farm savings are siphoned off into competitive channels.

That is why General Electric, through advertising, and other forms of promotion, is already reaching the farmer with the facts about power.

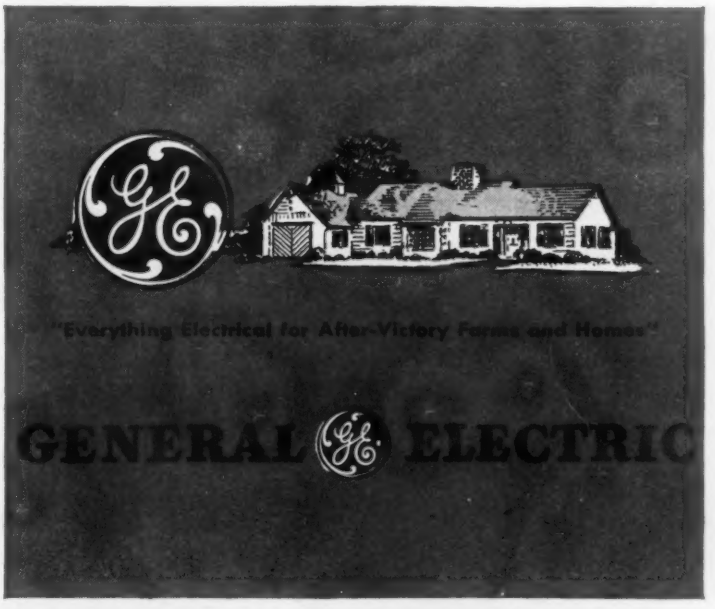
That is why we urge utility companies to join with us in this campaign to encourage the increased use of electrical power on the farm.

Your stake in the load-building possibilities of this huge market calls for immediate action.
General Electric Co., Appliance and Merchandise Department, Bridgeport, Conn.

FOR VICTORY

General Electric is working night and day to speed the attack.

You can help, too, by buying and holding more War Bonds than before.



TUNE IN: "The G-E All-Girl Orchestra," Sunday 10 p.m., E.W.T., NBC —"The World Today" news, every weekday, 6:45 p.m., E.W.T., CBS.

EASY TO HANDLE

The Fargo Connector

HOOK ON LINE
INSERT TAP
TIGHTEN BOLT

You cut out waste motion when you use the Fargo Connector. It's built as one unit, free from loose parts, and *always threaded.* No time lost starting a nut, no chance of cross threading.

Re-use the Fargo Connector, again and again. With its rugged Everdur body and Duronze bolt, the Fargo Connector "grips like a vise" every time.

Made by
FARGO MFG. CO.
Distributed by

LINE MATERIAL CO.
MILWAUKEE, WIS.
LM

BULLETINS

data books, etc.

Substation (1125)

The outdoor substation's role in producing aluminum for airplane production is treated in a publication issued by Delta-Star Electric Co. Pictured is a 225,000-kva., 13.8-kv. substation incorporating heavy aluminum channel buses.

Breaker Maintenance (1126)

For those responsible for air circuit breaker performance, I-T-E has published an eight-page bulletin entitled, "Keeping Air Circuit Breakers In Trim." Text and illustrations give maintenance and operating suggestions.

Fuse Puller (1127)

Trico Fuse Co. has published a new data sheet on its fuse puller, a tool for removing and replacing fuses, adjusting switch and fuse clips, handling test tubes, etc.

Transformers (1128)

Allis-Chalmers subway distribution transformers are described in a company bulletin. These units are available in standard sizes and voltages. Specifications include standard NEMA accessories and construction.

Battery Welding (1129)

A 12-page booklet, entitled "The How and Why of Storage Battery Welding", has been released by the Progressive Welder Co.

Electronic Tubes (1130)

A 24-page booklet published by Sylvania Electric Products, Inc., describes nine types of electronic tubes for specialized applications. They include strobotrons for the study of reciprocating and rotating motion; Pirani and thermocouple tubes for measuring vacuum; voltage regulator tubes; facsimile tubes; germicidal tubes; black light and near ultraviolet lamps. Technical information deals with specifications, basic circuit diagrams and suggested applications. Fluorescent lamp characteristics are given in tabular form and curves.

Manganin (1131)

A booklet on Driver-Harris Manganin has been prepared by that company. It contains engineering data, wire and shunt applications.

Solenoids (1132)

Cannon Electric Development Co. has issued a new bulletin on d-c solenoids. The 32 pages contain photographs of the Cannon line, tabular data, dimensional drawings, wiring diagrams and response characteristic charts.

Oilers (1133)

Trico Fuse Mfg. Co. describes its thermal and bottle oilers in a data sheet recently released.

Plastics (1134)

Bakelite Corp. has issued a 12-page booklet on Polyethylene resins and plastics. Forms, properties, fabrication procedures and uses are described. Data tables present graphic summaries of the plasticity, electrical properties and thermal expansion of this resin.

Welding Control (1135)

General Electric is offering reprints of a series of articles originally published in "Electronics" magazine on fundamentals of electronic control for resistance welding.

Lamp Price Sheet (1136)

A price schedule of large Mazda and Type D lamps has been issued by General Electric lamp department.

Lamp Fixtures (1137)

Mitchell Mfg. Co. has prepared a 12-page catalogue of its new line of all-steel industrial fixtures. Illustrated.

ELECTRICAL WEST, 68 Post St., San Francisco, 4, California

Please send me information about following CIRCLED items:

1100	1101	1102	1103	1104	1105	1106	1107	1108	1109
1110	1111	1112	1113	1114	1115	1116	1117	1118	1119
1120	1121	1122	1123	1124	1125	1126	1127	1128	1129
1130	1131	1132	1133	1134	1135	1136	1137		

Name..... Company*..... Title*.....

Address.....

* Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.

Get rid of OUTAGES

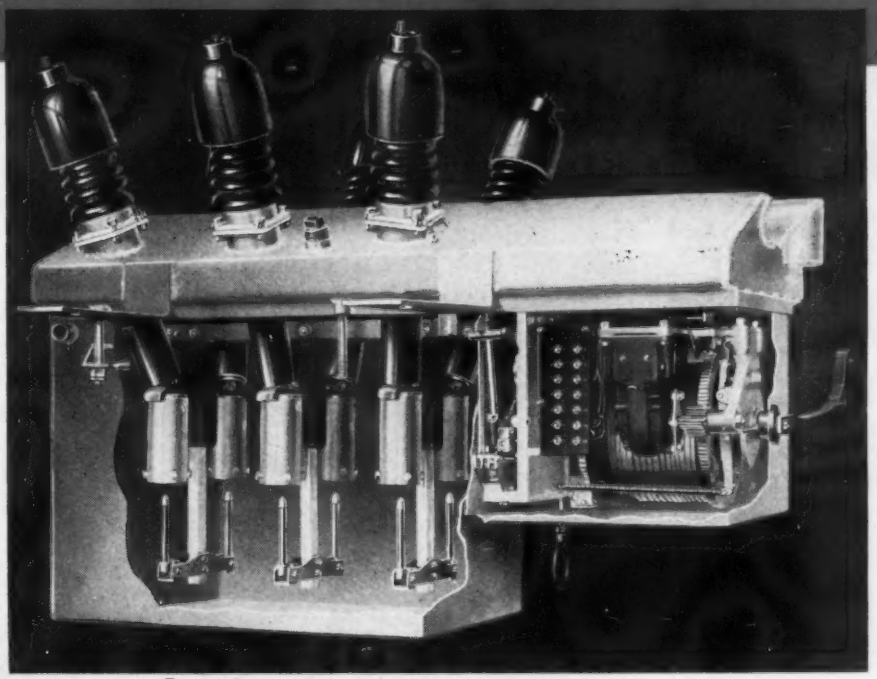
CAUSED by TRANSIENT FAULTS

on Rural or Low-Revenue Distribution Lines

PACIFIC ELECTRIC'S

Motor-Rewound

AUTOMATIC SERVICE RESTORER



Type AP-40, 100 Amperes Continuous, 1800 Amperes Interrupting Rating, 15-kv.

Three Reclosure Protection Before Lockout on Sustained Faults

You can get rid of outages caused by blown fuses on rural or low-revenue distribution lines by installing the Pacific Electric Automatic Service Restorer.

It clears immediately any number of transient faults.

It is operated by an automatically-pre-wound spring. After the first reclosure, a 115-volt motor starts rewinding the spring, taking 60 seconds rewinding time for the energy expended in each reclosing operation. If faults are 60 seconds apart, the spring is always fully wound—giving 3-reclosure protection at all times before lockout which occurs on sustained faults.

There is a choice of reclosing intervals, also easy outside adjustments of current and inverse-time-delay tripping. Emergency manual operation is provided.

To save oil and contacts, the Automatic Service Restorer has the Expulsion Contacts which clear arcs rapidly.

All of this adds up to greater safety and a saving of line patrolling. So ask for full details about the Motor-Wound Automatic Service Restorer which gets rid of outages caused by transient faults on scores of installations the nation over. One of these restorers successfully cleared 242 faults in 8 days, during a sleet storm, without lockout.

C. H. Cutter
1015 Securities Bldg.
Seattle 1, Wash.

G. B. Kirkwood
437 S. Hill St.
Los Angeles 13, Calif.

J. E. Redmond Co.
448 W. Madison St.
Phoenix, Ariz.

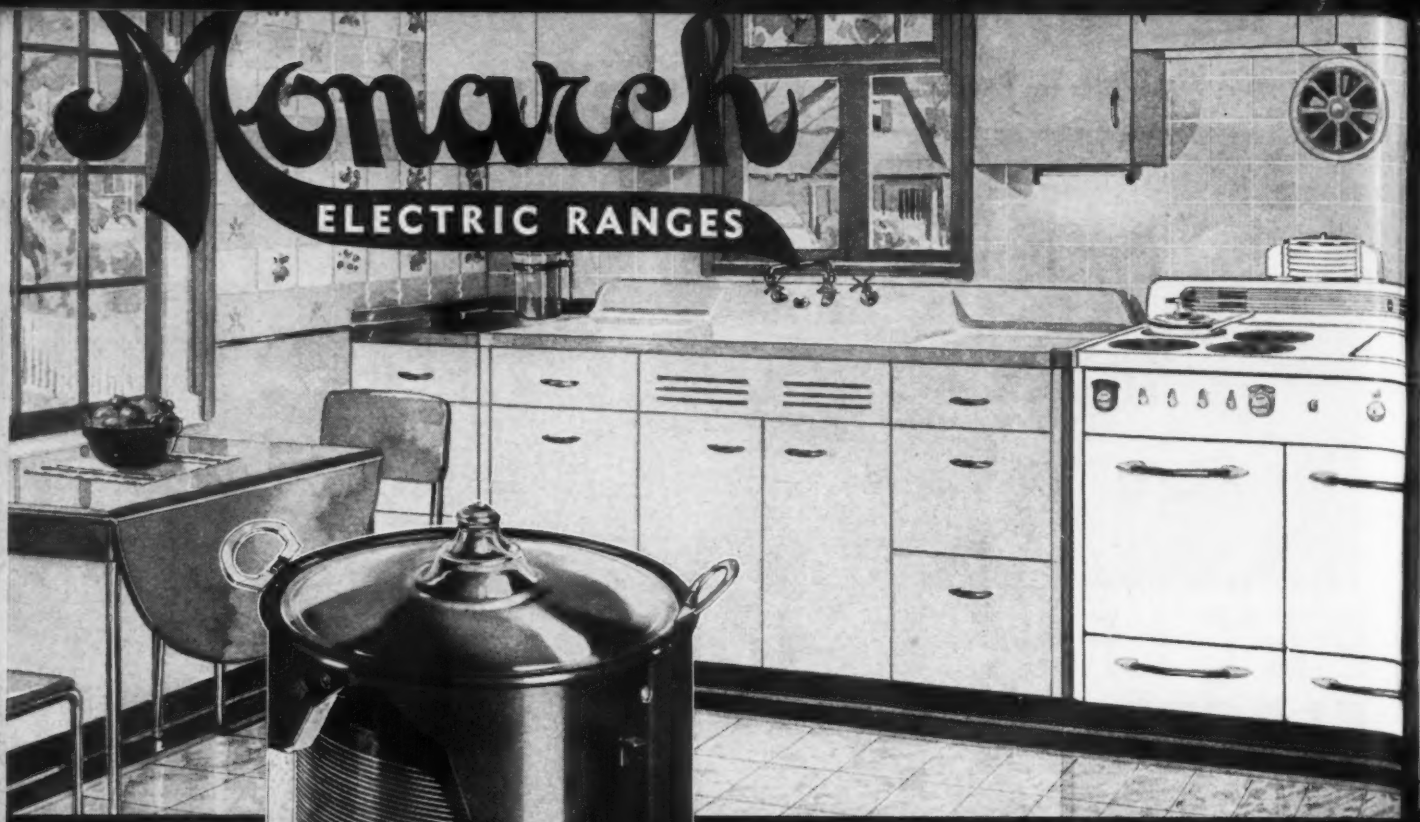
R. Ackerman
318 Dooly Block
Salt Lake City 1, Utah

Other Representatives in Principal Cities

Pacific Electric Mfg. Corporation

5815 THIRD ST., SAN FRANCISCO 24, CALIF. P. O. BOX 419, GARY, INDIANA

Monarch
ELECTRIC RANGES



SIDE-HEET" →
APPLICATION

Yes, you can even bake a cake in the Monarch Surface Oven.

A 2½ lb. whole chicken, or 5 lbs. of jointed chicken, can be roasted to a tender brown.

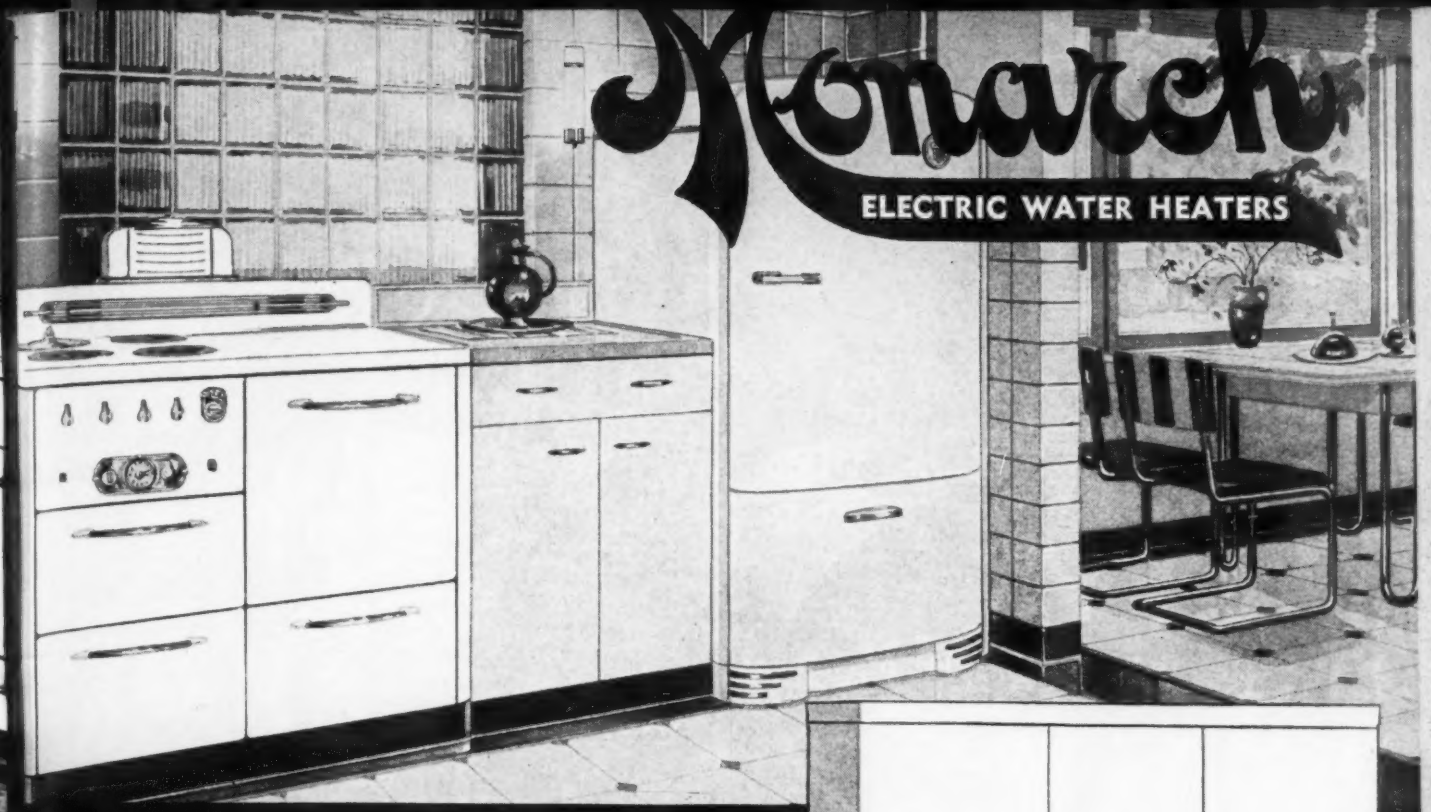
Sauerkraut and spare-ribs is a "natural". "Side heet" browns ribs while sauerkraut steams.

If "weenies" are preferred with sauerkraut, here's a clever way to do it.

Higher Cooking Efficiency for the Post-War Kitchen

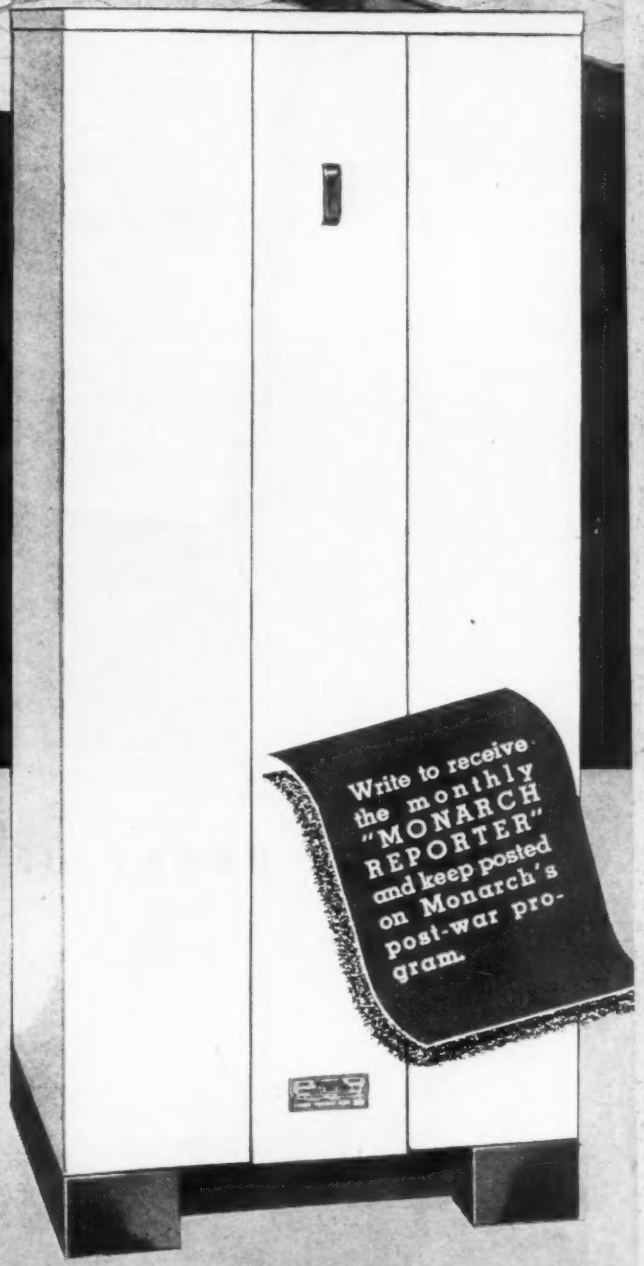
These cooking "miracles" performed in the Monarch Surface Oven are made possible by *side application* of heat — which is another one of the many exclusive features Monarch dealers will have to offer as soon as Electric Ranges are again on the market. Now is a good time to make sure that *YOU* have the selling advantages of Monarch's many exclusive features with a MONARCH exclusive franchise.

MALLEABLE IRON RANGE CO.
3294 Lake St. Beaver Dam, Wis.



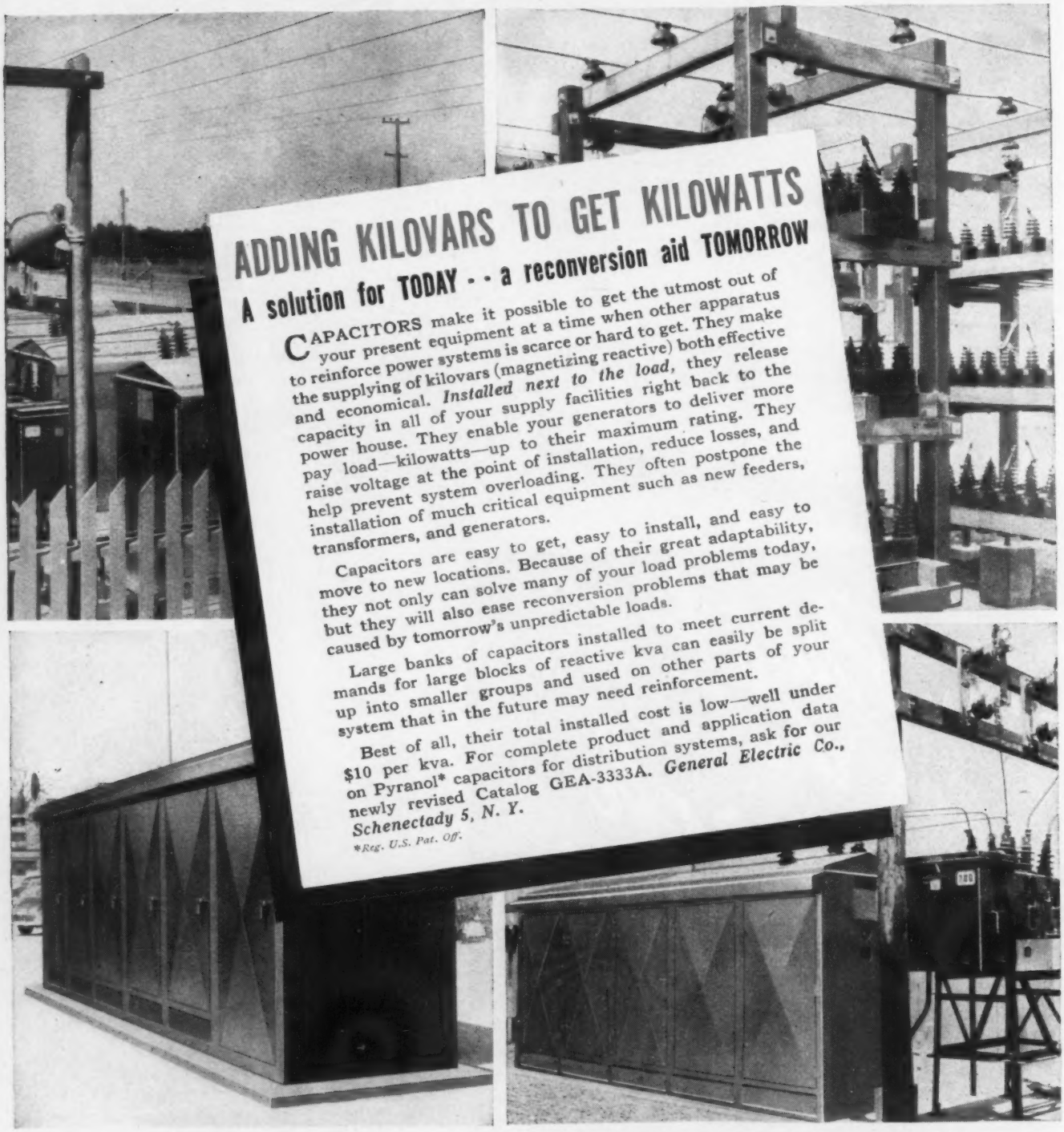
Extra Profits for the Monarch Dealer!

Electrically heated water in the post-war kitchen will go hand in hand with electric cooking. Which means that you, as a Monarch dealer, can make *two* sales instead of one, *two* profits. Check with the factory now and get lined up on your Electric Water Heater franchise.



MALLEABLE IRON RANGE CO.
3294 Lake St. Beaver Dam, Wis.

KEEP THE ENTIRE FAMILY IN HOT WATER



ADDING KILOVARS TO GET KILOWATTS

A solution for TODAY - - a reconversion aid TOMORROW

CAPACITORS make it possible to get the utmost out of your present equipment at a time when other apparatus to reinforce power systems is scarce or hard to get. They make the supplying of kilovars (magnetizing reactive) both effective and economical. *Installed next to the load*, they release capacity in all of your supply facilities right back to the power house. They enable your generators to deliver more pay load—kilowatts—up to their maximum rating. They raise voltage at the point of installation, reduce losses, and help prevent system overloading. They often postpone the installation of much critical equipment such as new feeders, transformers, and generators.

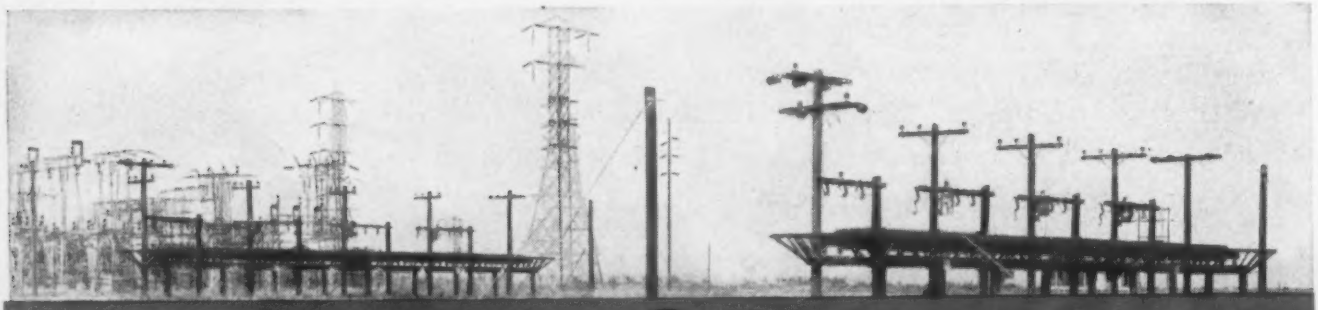
Capacitors are easy to get, easy to install, and easy to move to new locations. Because of their great adaptability, they not only can solve many of your load problems today, but they will also ease reconversion problems that may be caused by tomorrow's unpredictable loads.

Large banks of capacitors installed to meet current demands for large blocks of reactive kva can easily be split up into smaller groups and used on other parts of your system that in the future may need reinforcement.

Best of all, their total installed cost is low—well under $10 per kva. For complete product and application data on Pyranol* capacitors for distribution systems, ask for our newly revised Catalog GEA-3333A. *General Electric Co., Schenectady 5, N. Y.*

*Reg. U.S. Pat. Off.

LARGE BANKS OF PYRANOL CAPACITORS



GENERAL ELECTRIC

BUY WAR BONDS

Rural Mileage at Lower Cost

WITH THIS STEEL CONDUCTOR

During these war years, you've probably heard a good deal about Ruralductor, Bethlehem's rugged steel conductor for use in rural electrification programs. You're going to hear more about it as time goes by, for Ruralductor is already the choice of many electrical engineers who are considering postwar mileage in the outlying farm districts not yet electrified.

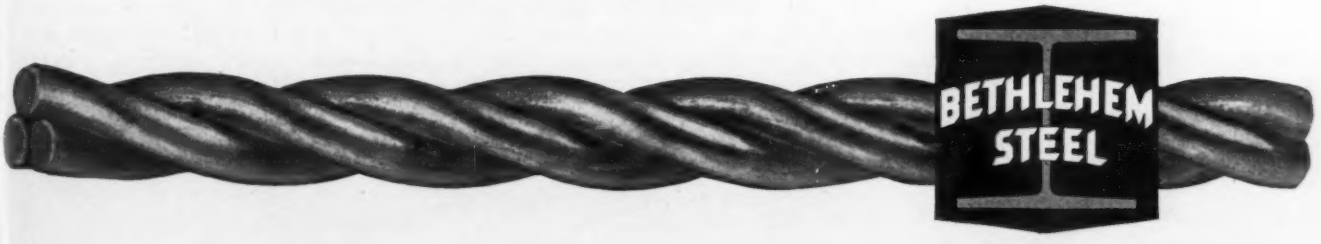
The selection of Ruralductor has been dictated by the clear-cut economy it offers for rural lines.

Since Ruralductor is made of steel, it has the strength that makes possible longer spans—with consequent *reduction in the number of pole structures needed.* To obtain the equivalent strength in a non-ferrous material, you would need a conductor so large in section that it would not be economical.

True, Ruralductor's electrical capacity is less than that of non-ferrous conductors. It is, however, entirely adequate for areas where secondary feeders and tap mileage predominate. Ruralductor is recommended primarily for this type of installation; when used as intended, it has already more than proved all claims made for it.

Protection against corrosion is assured by the bethanized coating, a ductile, uniform "armor" of zinc that is applied to every wire by an electrolytic process. The zinc is 99.9 per cent pure; is bonded directly to the wires. Bethanized coatings are available in A, B, and C weights, the choice depending upon corrosive conditions at the points of installation.

If you are planning to increase your rural mileage, either now or after the war, talk to a Bethlehem man about Ruralductor. It offers economies and other advantages that you cannot afford to overlook.



ELECTRA'S HUSBAND

The Co-op Next?

"WE'RE going to buy a new washer," Electra announced as I walked into the kitchen where she was preparing dinner one evening recently. "Who's kidding who?" I bantered, lifting the lid from a pot which was exuding a particularly appetizing odor. "There won't be any new appliances until after the war and you know it."

"Keep your nose out of those pots," was Electra's retort. "And I'm not kidding anybody. We're going to buy a new washer and what's more we are going to save money."

"That last part interests me," I said, "but you can't convince me that we'll get any new appliances until after the war. Everybody in the electrical business knows that and whoever tells you the contrary is misrepresenting facts."

"No one said *when* we were going to get," Electra said. "We place the order now. And we start paying for it now."

"All right, if this is one of your gags, come out with the facts," I countered. "I'll bite, so you can tell me all there is to the story."

"Well, it's this way," Electra said. "First we join the Co-op Union. Once we are members we get all of the benefits. They are taking orders now in the hardware and electrical department for new electrical appliances. We need a new washer, so I thought we might as well get our order in first. Besides we get a discount. The membership fee is only $10. Once we pay it, we can buy our gasoline, tires, groceries and nearly everything else from the Co-op and save money."

"How about ration points?" I asked jokingly. "Do you have to give them 'A' tickets for gas?"

"Oh, yes," Electra said taking me seriously. "But I have all of the dope. It's on the desk in the living room. Why don't you read it while I'm finishing dinner."

"The dope" consisted of two legal-sized mimeographed sheets. I read them first with curiosity, then with interest and finally with some real concern. You see, I'm one of those deluded persons who up to now had thought anyone who mentioned the postwar "co-op menace" was airing a pipe dream. Such talk simply didn't register. "Business will be done in legitimate channels like it always has," was my pat answer to the "trouble makers" who repeated any such nonsense. There are numbers of similarly deluded people who have and hope to continue to make their living in the electrical business legitimately who are due for a rude awakening if Electra's information is typical.

For the benefit of unbelievers like myself, I quote from the first page of Electra's "dope":

"*Announcing a New Appliance Repair Department:* repairing of washing machines, refrigerators, table appliances, etc. Your grocery Co-op will act as a depot for your convenience. Leave them there for repair.

"*Special Offer:* Your appliance serviced, cleaned, oiled and checked for defects at a $3 flat rate. If mechanical defects needing repair are discovered, $2.50 an hour for labor plus a charge for parts. *Consumers' Union* recommends this to forestall major breakdowns, thus helping to make your equipment last until new appliances are available. Most appliances break down because of lack of attention.

"*New Appliances:* A limited quantity of new appliances will become available within a few months. So that you may be assured of the equipment you need, we suggest that you order and pay for the appliances now. Our prices will be competitive, with satisfaction guaranteed or your money cheerfully refunded. (This advance deposit will assist your Co-op in getting its share of new appliances for you.) Pay smaller amounts weekly or monthly—but those with half or more paid will be given preference when they arrive. Call us for estimates to determine deposit requirements.

"*Milking Machines:* We are agents for milking machines, farm water heaters and sterilizing equipment, pressure water systems and electric fence controls. Do you own a farm, or have friends in the business? Tell them to see us!"

This particular co-op is located in a metropolitan area. I wondered what in the devil they were doing in the farm equipment business as I read the descriptive material. Later on the wonder changed to awe. The Co-op handled everything, and if it didn't carry what you might want in stock, it offered to get it for you. I read more:

"*Water Heaters:* We can supply water heaters or water heater parts. Any householder has priority to get a new heater or repair parts if your old one is worn out. See your Co-op first!

"*Radio Repair:* This is an additional service to offer you. Radio repair done for you, through a reliable wholesale agency. Leave them at one of the grocery depots or here at the Co-op Union. Parts and tubes will not be sold over the counter at present."

Wouldn't the legitimate dealers of that wholesale agency be happy if they knew about this, I thought. Then I read that one could get express money orders from the Co-op, that clothing could be bought at a closeout of 25% off; that a fruit juicer could be rented; that the goods handled ran the gamut from cosmetics to victory garden supplies. One section headed "Scarce Items" listed flashlights and batteries, thermos fillers and a lot of other hard-to-get merchandise.

Well, there it is—a wartime co-op setting up for postwar, I thought. Right in the backyard of a lot of our best dealers. And I'll wager anything from marbles to chalk that they don't even know about it. And if they do, I wonder if they have any plans about combating co-ops. Time was when the chain stores were the "competition." Will the co-op be next? But this kind of reasoning wouldn't affect Electra.

"Have you made up your mind as to the kind of washer you want?" I asked her at the dinner table later.

"Definitely," she answered. "It must be automatic, vibrationless, quiet . . ."

"No, I mean the brand," I said.

"Why yes, it must be a . . ."

"Never mind," I cut in again. "Suppose that the co-op doesn't handle that brand? Suppose they try to give you some inferior piece of equipment—something you never heard about?"

"I never thought of that," she mused.

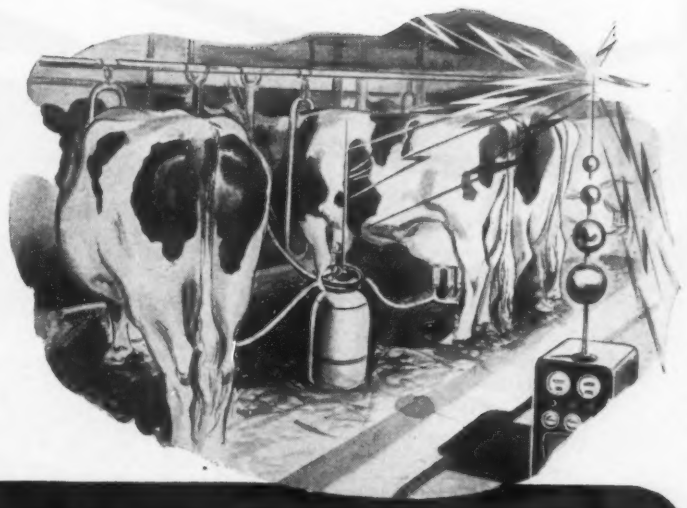
"And besides, you didn't read that you might have to work at this co-op place if you belonged to it, did you? They asked for volunteers to help staff the new hardware and appliance department. Would you go in for that?"

"Forget I ever mentioned it," she said. Which is what I'm afraid a lot of folks in the electrical business are going to say, too.

Post-war pipe dreams you better not count on

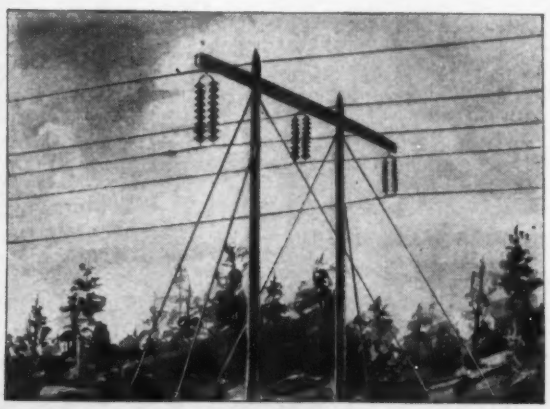
RURAL POWER BY RADIO WAVES

Perhaps someday every farm, or every barn, will receive its electric power over a radio carrier wave. Churns and pumps will whistle while they work on wireless power your company supplies. However, your customers will have a mighty long wait before it happens.



BUT RIGHT NOW YOU CAN PLAN—

SUPPORT FOR YOUR LINE STRUCTURES WITH GALVANIZED STEEL STRAND



Guy, span and ground wires need the tensile strength, ruggedness and endurance which steel alone can give them. All three, plus economy, are combined in Crapo galvanized steel strand. Long life and low maintenance of this superior steel strand is a matter of record with America's leading utilities.

Rigid manufacturing controls make certain that all Crapo galvanized steel strand meets every requirement for tensile strength, elongation, gauge, galvanizing and ductility. Seven wire strand is available in 9 sizes from 5/8 to 5/32 inch diameter; three strand from 1/4 to 3/8 inch.

FOR RURAL LINES — Crapo HTC 130 low-resistance, low-reactance steel conductors effect important economies in construction and maintenance, and reduce transmission losses.

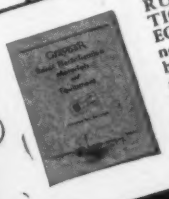
GRAYBAR'S NATIONWIDE NETWORK

of more than 80 warehouses assures you a convenient local source of supply for more than 60,000 electrical items — backed by experienced power transmission and distribution application aid, plus assistance on problems of lighting, wiring and communication. A Graybar Man near you is ready to make your electrical supply problems his personal responsibility. Why not take advantage of his time-saving assistance?

5516

via GraybaR

RURAL ELECTRIFICATION MATERIALS AND EQUIPMENT — Graybar's new 88-page time-saving buying guide is now available from your local Graybar representative (or write direct if you prefer.) Contains valuable new installation data.



"Premium" steel costing more per ton than ordinary merchant pipe.

Alloy composed of surface steel and zinc making a new metal, zinc-steel alloy.

Surface zinc over the alloy may be as thick as desired.

Sherasolution which impregnates zinc.

To Keep Away From Rust

** * To Keep Wiring Safe*

Sherarduct

* Threads as well as interior have equal protection with the outer wall of the conduit.

"Sherarduct" Conduit is made from high quality pipe. Under the Sherardizing process, the conduit is made rust-proof, strong and durable. "Sherarduct" may be bent to conform to the necessary angles with a minimum of elbows. Once installed, "Sherarduct" becomes a well-joined, enclosed electrical raceway, fabricated into the job easily to withstand the test of time.

The same high quality materials used in the manufacture of "Sherarduct" are also used in the manufacture of other National Electric products. Write for the Engineering Data Book which lists our complete line of wiring materials.

ELECTRICAL WEST

NOVEMBER, 1944
VOL. 93 NO. 5

PLAYS AND CONTESTS MAKE INSTRUCTION DIGESTIBLE

HOW to instruct utility employees in routine educational classes has long been a headache to most personnel managers. The moment employees suspect that they are to be propagandized, or filled with facts favoring the business institution, difficulties of human nature sprout like buds in a potato barrel.

Employees, with characteristic self-interest, often want to hear favorable news regarding their own personal problems. Instead, educational classes are given to talk about corporate hazards. "Everyone sit still while we tell you about the company," is the unhappy approach. Then follows the treatment of a wide variety of subjects, including load building, accounting, collection practices, courtesy, and holding companies.

To make matters worse, unwelcome subject matter has often been drably and uninterestingly handled. Either the foreman was instructed to lecture to his employees on a line of reasoning not his own, or a personnel representative dropped in to recite from standard mimeograph documents. Often employees took turns, each reading a paragraph of the prepared text, or the instructor would read the question and employees rotated in reading the answers. They went something like this:

Question: "Are employees discourteous?"

Answer: "Absolutely not."

Question: "Have private utilities made exorbitant charges for electricity?"

Answer: "Absolutely not. The utility rates have always been fair and reasonable."

Employees not engaged in reading prepared answers, sat outwardly cowed, but inwardly stubborn. They considered their intelligence insulted, and after the second or third year of prepared class material, shopworn and boring, employee attitude found that one out of three wanted nothing to do with education. Other employees, realizing the importance of factual data, asked that presentation methods be revised.

The Washington Water Power Co. recently assigned the problem of employee education to the advertising and promotion department, with instructions to devise something acceptable to employees. Employees were asked by means of questionnaire to state what subjects needed discussion. A long list of items by this commonsense approach came to light. Employees checked off various phases of public relations, collection practices, history of the company, reasons for policies, wages, grievances and opportunity. Surprising was it that a majority of employees indicated that their primary concern was company-customer relations, while their own problems were given secondary importance.

After the questionnaires were in and tabulated, weight was given to subjects as indicated. To these expressed topics, management added data of broader significance such as postwar planning. Then the program was ready for construction.

The formula of each class meeting was simple. Emphasis was given primarily to the matter of maintaining interest. For example, the master of ceremonies, after a few words of welcome, spent ten minutes or so discussing human nature such as, what do all people strive for—their ideals, ambitions, responsibilities, hates and fears. The company's contribution to

Short skits, staged by the employees themselves, help to "get across" the ideas to the forum group. Here the actors are: Carl Bachman, Willard Ormsby, Beulah Pollock and Ted Irwin

these human drives was pointed out as incidental.

Thus gaining attention by talking to the employee about himself, prescribed subjects were handled according to importance as shown in the questionnaire. Replacing the question-answer method of instruction, the advertising department prepared short skits, dramatizing the subject matter. Four, five or six employees memorized and acted various parts. One playlet featured a hero-employee in a tavern, talking to typical customers; another at the bridge table, or a P.T.A. meeting, or in a town hall long before industry came into being. In these little situations, with hero and villain and citizens all, human relations were discussed, or employee loyalty, courtesy and other vital issues. A wealth of talent and acting ability is found among employees, and several rehearsals throughout the day previous to performance were usually sufficient. The action gained attention. True to habit, sympathies of the audience went to the hero, which was a company employee, and employees absorbed the messages without realizing that they were being instructed.

Referendum 25 came up for discussion at one meeting of the employee forum

Several short skits were shown in each meeting and between skits, the master of ceremonies re-emphasized with charts and graphs, points under discussion.

To make certain that employees learned something during the meeting, a brief question and answer period preceded the end of each class. Here again, interest was maintained by the lottery method of stating the question and then drawing an employee's name from the hat for the answer. If the employee could not answer the question, his name card was put back for another chance drawing. If the answer was correct, a duplicate card was dropped in a box for the final drawing which was scheduled for the end of the series of classes and offered a dozen or so war bonds as prizes. The more times an employee name was drawn from the hat, and the more correct answers he gave, the greater were his chances to win a war bond. Some classes reached 98% perfect answers.

Supplementing class instruction, brief paragraphs titled *Know Your Company* were printed in the company house organ each month. Previous to the classes, scores of employees were seen studying the pages of their house organ, so as to be prepared.

Classes usually lasted for one hour and were held on company time. The ideal class comprised seventy-five to a hundred employees, taken at random from all departments. It is a psychological fact that a large group will contribute most to morale. For example, ten members of a skeptical line crew can freeze any instructor out of his enthusiasm, but sprinkle these ten linemen among a group of seventy employees, old and young, male and female, and the bad boys are at once on their good behavior. Further, dissenters cannot help but catch the group spirit of response.

Employee actors are changed from month to month, it being assumed that participation helps to make better employees. What's more, the enthusiasm employees feel for something they help to create is carried back to their several departments. It multiplies with participation.

Washington Water Power educational classes have been surprisingly successful. Where employees once groaned at the mention of classes, now they ask: "What will you talk about next time?" "When do we meet again?" "Blank-blank sure made a swell old lady." "You know, last night I used the same arguments I heard in the meeting . . . worked pretty good, too."

Kimball Jack, manager of the advertising and promotion department, comments that his classes are nothing unreasonable, but are the result of a little extra effort. Whether or not a thing is mediocre depends entirely upon the amount of time and effort that is given it.

Utah Pension Plan

To its program providing sick leave with pay and insured hospitalization for sickness or accidents, the Utah Power & Light Co. has just added a management-proposed retirement income plan for employees. The new plan will be paid for by the company only and will allow the retirement of employees at 65 years on a satisfactory basis of pay.

Utah Power & Light group insurance provides death benefits from $2,000 to $10,500 on a plan in which employees pay 50 cents and the company 75 cents per month per $1,000 on this insurance. Sick benefits are provided through an employees' Mutual Aid Assn. With the retirement plan a full security program is assured the employees.

Under the program, 964 full-time men and women between the ages of 35 and 65 were eligible as of last Christmas and new employees 30 years and not over 65 will become eligible under specified conditions. The company's statement enunciates the principle that business itself should face its responsibility to employees and provide essential security as a part of the proper cost of doing business.

"In addition to meeting this responsibility, employee security within the company means (a) more efficient and safer work because of greater freedom from worry, (b) less turnover of employees with resultant savings in training, plus the elimination of inefficiency due to unfamiliarity on the part of new employees, (c) greater loyalty toward the company, (d) an increased degree of stabilization of salary and wage schedules, and (e) less demand for more political social security which will require higher taxes."

The company also feels that, by inaugurating the plan now and retiring those over 65 at the end of the war, it will make room for many employees in military service who will be returning.

Spokane 13-Kv. Distribution

Change-over from 4-kv. provides for handling greatly increased loads. Lower unit costs, less losses, and better service are results

M. F. Hatch
Electrical Engineer
Washington Water Power Co.

PRIMARY distribution systems operating in the higher voltage bracket of 12 to 14 kv. are now in general use for supplying high-class residential service in a number of cities, although mainly their development has been within recent years. As residential loads continue to increase, high-voltage primary distribution is certain to become more prevalent for supplying this class of service, particularly in view of its many advantages, backed by several years of successful operation. It is one of the most promising means of supplying a large increase in load with the highest quality of service, while at the same time meeting the demands for lower investment and operating costs.

In Spokane, The Washington Water Power Co. at present supplies 15%, or 6,000 kw., of the residential load over 13-kv. primary distribution lines. Within ten years, it is expected that 27,000 kw., or 40%, of the residential load will be distributed at 13 kv. It is not contemplated that any of the existing 13/4-kv. step-down substations of permanent nature will be prematurely abandoned. Rather it is planned to utilize completely their remaining life by gradually restricting the 4-kv. service areas surrounding these substations as required by future load growth so as to limit loads to the present substation capacities. The gradually enlarging areas in between and furthermost away from these substations will be supplied over primaries converted to 13-kv. operation. In addition, all extensions to new developments of any size will be served at 13 kv. This will require the establishment of six segregated 13-kv. primary areas in Spokane to supplement the ten existing 13/4-kv. substations located with respect to each other as shown in one of the diagrams.

A common neutral grid in the secondary position encompasses both 13-kv. and 4-kv. primary areas. The apparent advantages of this plan are that conversion is undertaken and capacity added in small increments only as required by load growth, and that 4-kv. areas are contracted so that increasing load densities can be adequately served at this low voltage over the existing primary copper.

The decision to adopt the 13-kv. primary system for supplying all future load growth, thus departing from the hitherto conventional path of 4-kv. radial distribution, resulted from considerable study and investigation and operating experience, which disclosed the following many superior features of the higher voltage primary system:

(1) Lower investment costs, which can amount to as much as $5/primary kva.

(2) Lower losses, amounting to an 80% reduction in 4-kv. losses, which, when capitalized, can be equivalent to a saving of $5/kva. in primary investment.

(3) Better load carrying ability and voltage regulation, for supplying large postwar load growth, possibly to an average consumption of 12,000 kwh. annually per customer.

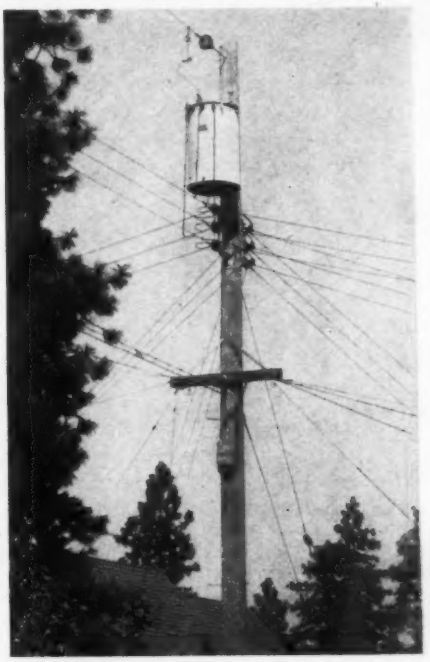
(4) Simplification and improved appearance of pole lines, which can be a large factor in forestalling agitation for underground distribution systems.

(5) Lower maintenance and operating costs.

(6) Improved service continuity.

(7) Greater flexibility.

These factors will be elaborated upon in the following description of the Spokane 13-kv. primary system.



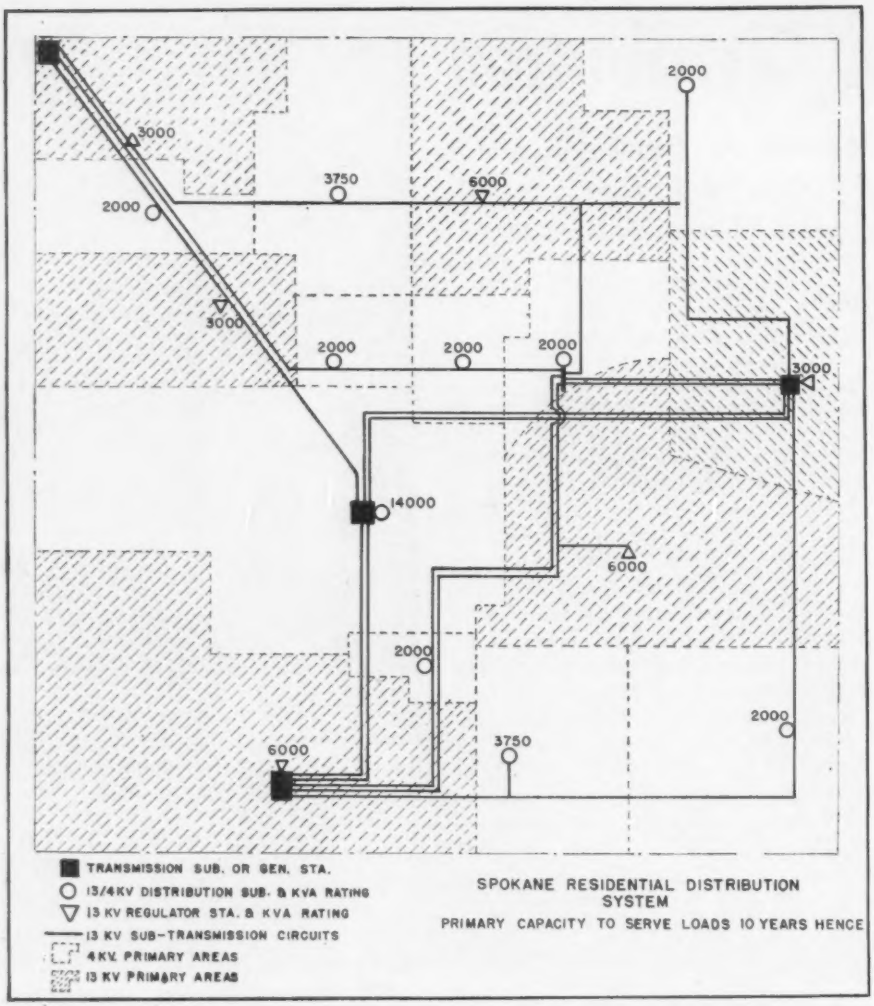
Typical 7,620-volt single-bushing transformer mounted on dead-end pole used jointly with telephone company. Note cutout link and secondary racks

Single-phase 7-kv. joint line with multiple street lighting circuit run along rear property lines through heavy trees showing minimum of trimming required

13-Kv. Feeder Equipment

Bulk power is distributed within Spokane over a 13.2-kv. grounded wye sub-transmission system which is fed from the transmission system through three main substations located near the city limits and from a generating station in the heart of the city. These four supply points are interconnected with large capacity 13.2-kv. network circuits, which are tapped at convenient locations to furnish the supply for the various 13-kv. primary areas.

A one-line wiring diagram of the equipment used for tapping the network circuits and controlling the primary feeder is here illustrated. Since approximately 250,000 kva. short-circuit current is available on the sub-transmission system, a three-phase 5% reactor is used to limit the fault current on the primary feeder to approximately 2,000 amp. The limited short-circuit current is within the rating of the regulator and fuse cutouts, and is desirable in reducing operating hazards and preventing extensive line burndowns. An oil circuit breaker of 50,000-kva. rating can then be used,



Six 13-kv. areas with three now operating shown integrated with ten existing 13/4-kv. substations that will be retained. System will serve 67,000 kw. residential load ten years in the future

and this is equipped for one automatic reclosing with the first trip-out by instantaneous relays, and the second by time delay relays. A step-voltage regulator then follows, and an air switch is provided for by-passing the complete line of equipment.

This equipment can be arranged in a very compact manner and installed very inexpensively in any of several ways as dictated by location. Unobtrusive installations can be made successfully in high-class residential districts on a back lot or alley corner where difficulty might be encountered in placing the much larger 13/4-kv. distribution substation. Or, even made if possible where considerable "beautifying" expenditure might be necessary to satisfy zoning requirements or public reaction.

The equipment presently used is rated at 3,000 kva. and is capable of supplying a maximum short-time residential peak feeder demand of 4,500 kva. during the winter season of low ambient temperature. Consideration will be given in the future to feeder supply equipment of larger rating, or regrouping of the equipment so that bus regulation and larger regulators may be used should it be desired to retain individual feeder capacities at the original value.

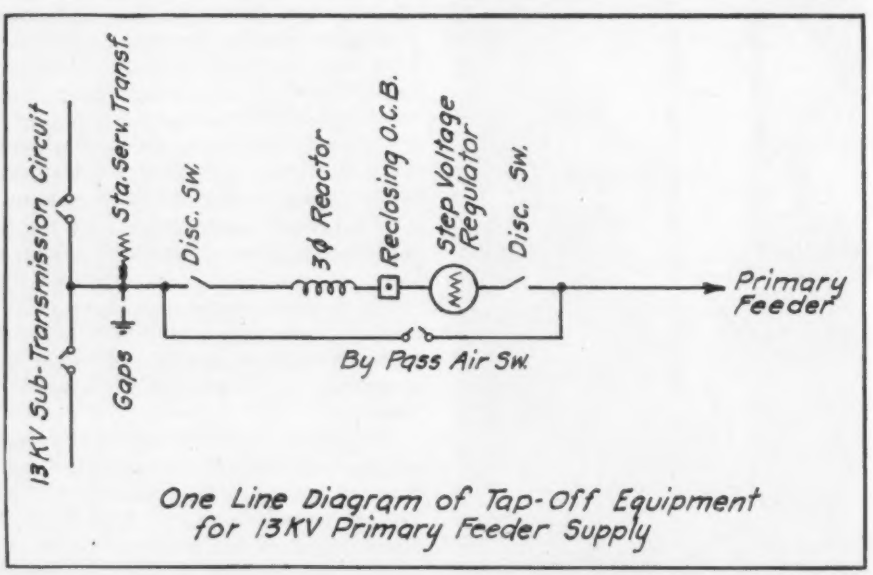
Diagram of equipment used to tap a 13-kv. sub-transmission circuit for regulated 13-kv. primary distribution

13-Kv. Primary Feeder

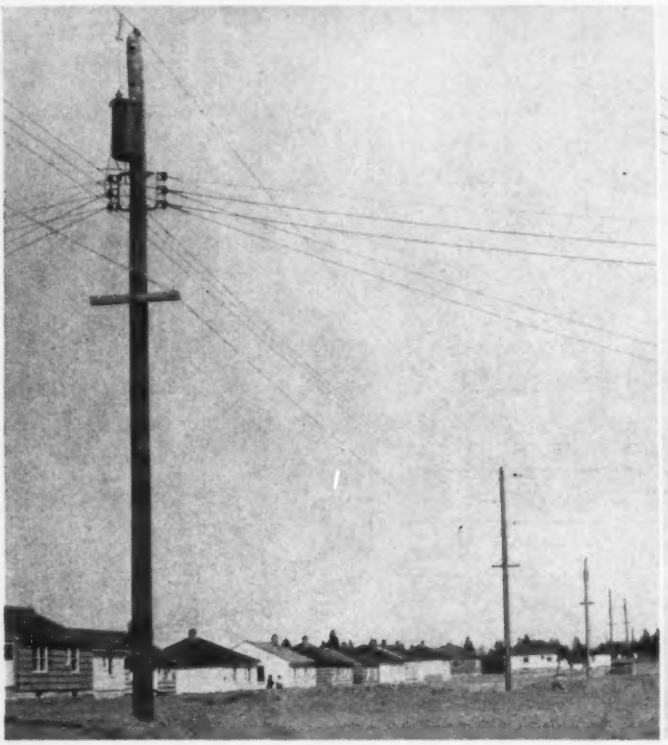
Each 13-kv. primary area will be supplied over one radial feeder with an arrangement similar to the one here illustrated, and which has now been in operation for three years. It so happens that this feeder originates at one of the transmission substations, but the supply equipment is identical to that which is used for tapping a sub-transmission circuit. This feeder serves a high-class residential district in which the range and water heater saturation is over 90%. The total peak demand last winter was 4,200 kva. at 93% power factor supplied over a total circuit length of 15 miles. The primary density averages 260 kw. per mile and secondary districts, which are not banked, are loaded to 70-80 kw. per 1,000 ft.

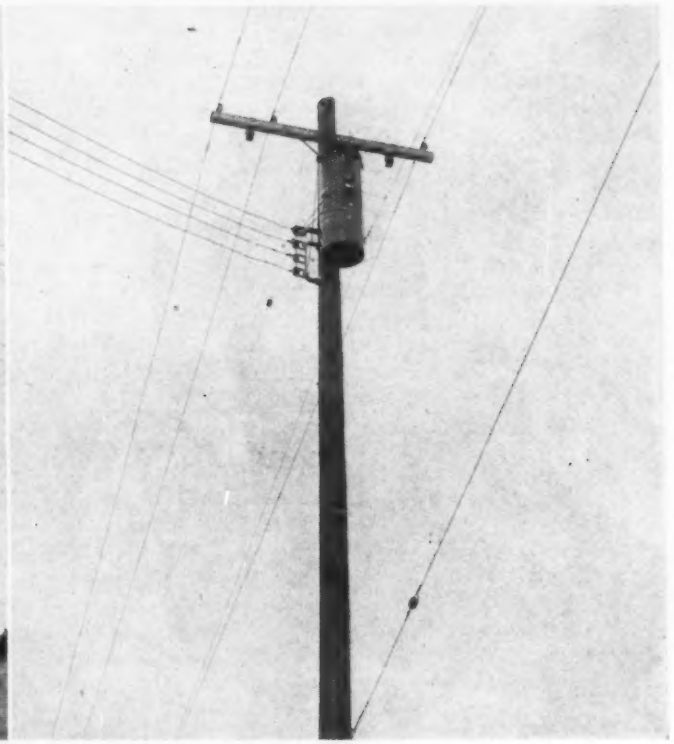
The feeder is sectionalized with open type cutouts in each phase fused at 150 amp. at three main locations where it is marked "M.O.T. 150a.", with two further sub-sectionalizing locations marked "M.O.T. 100a.", where 100-amp. fuses are installed. This effectively breaks up the feeder into load groups comprising less than 500 kw., which may be involved in a sustained interruption caused by a fault anywhere on the feeder except on the main trunk.

Single-phase laterals are extended to a maximum connected load of 175 kva. before the second phase is added. This permits the greater portion of the circuit to be built with a single primary wire mounted on the pole top as illustrated. The majority of these laterals will employ steel or composite conductors, although this was not originally done on this particular feeder. Vertical rack construction is used for secondaries and rack extensions are added to conform to the state construction law. Multiple street lighting wires are carried on single



One Line Diagram of Tap-Off Equipment for 13KV Primary Feeder Supply





Single-phase 7-kv. alley line serving new housing project (left). 200-ft. spans, bare service neutral, joint use, two electrified homes on one No. 8 service. (Right) Single-case, two-core open Y or delta transformer for serving small three-phase, four-wire loads

spool racks above the secondary rack, and the resulting pole line, as shown in the typical photographs, is one of utmost simplicity and pleasing appearance.

Single bushing 7,620-volt transformers are used exclusively for single-phase installations with the common sizes being 15, 25 and 37½ kva. The transformer secondary districts and loadings were designed through the kilowatt-hour estimating method that has been used in Spokane for several years, with the result that the average transformer loadings are 140-150% of rating, with the high ratio of 1.1 obtained for feeder peak load divided by connected transformer kva. Typical transformer mounting is shown by photographs. Wherever possible transformers are mounted above the secondaries so that they are in line with the pole line. Suspension type cutouts are used universally and have given very satisfactory performance. In the future it is planned to experiment more with connecting the transformers directly to the primary and fusing each lateral, or even larger transformer groupings.

Joint Pole Use

Joint use of poles with the telephone company is actively encouraged by both companies with the result that the great majority of power and telephone circuits in Spokane will utilize single pole lines. Joint use offers a fine opportunity in effecting economies in distribution costs and can be a large factor in incurring favorable public reaction through the elimination of duplicating and unnecessary pole lines.

Through cooperation of both parties, joint use of poles carrying 13-kv. primary circuits has been practically 100% accomplished, although many protective coordination problems have arisen that have required mutual solution. By limiting the maximum short-circuit current to 2,000 amp. at the regulating station, joint use where the telephone circuits are in cable has been generally accomplished without further protective considerations. Open wire telephone circuits are usually further protected with a special gap that requires coordination of the power feeder protective devices.

The instantaneous tripping of the primary feeder is accomplished by two phase-relays which operate at 280 amp. and a ground relay set at 100 amp. The time delay relays are in the three-phase leads and pick up at 400 amp., and in a few instances it has been necessary to reduce the size of branch sectionalizing fuses below 100 amp. The growing tendency of the telephone company to convert open wire circuits to cable, and their development of new protective devices promises to simplify coordination problems.

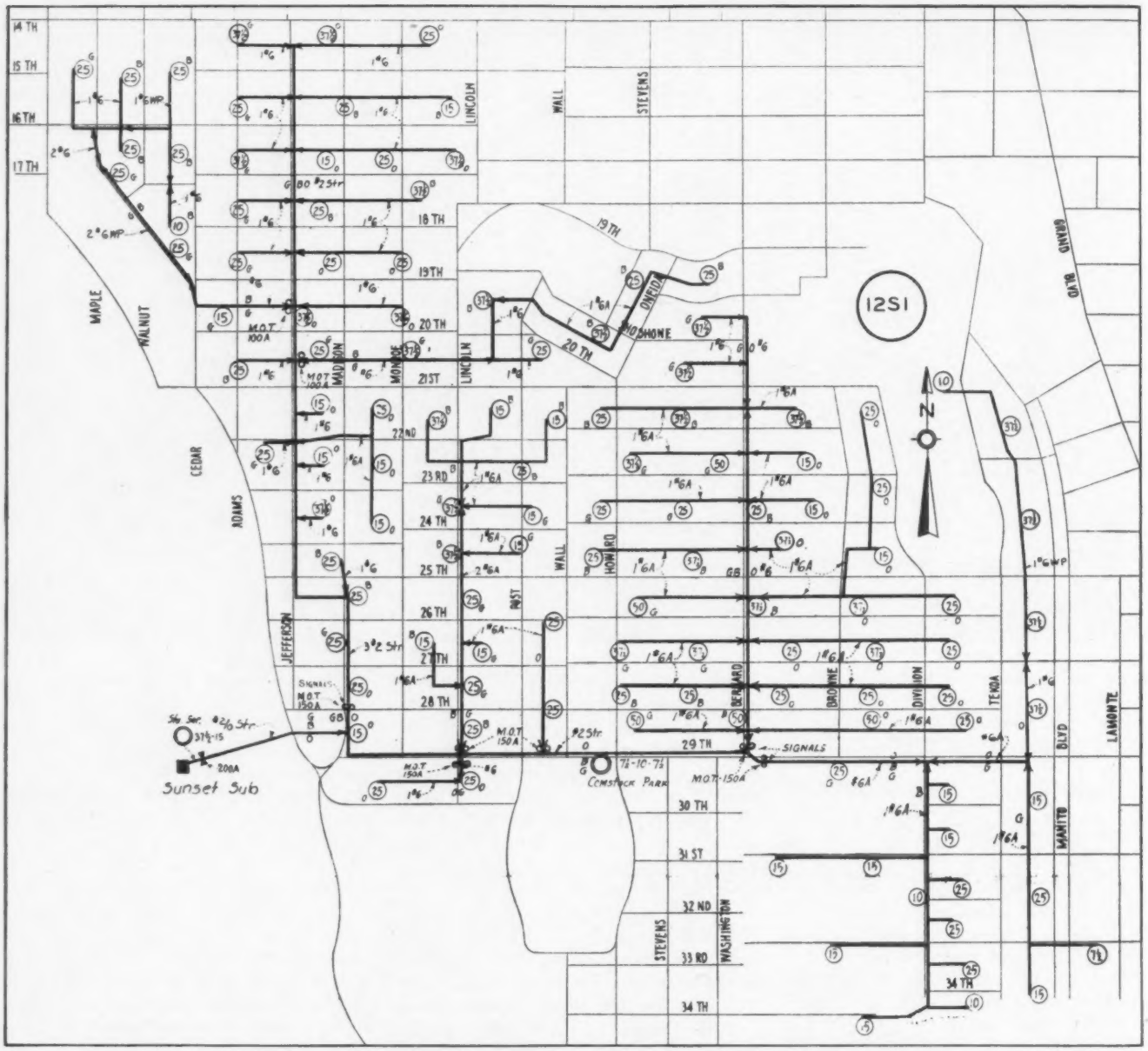
It is also planned to experiment with single-pole, high-speed circuit breakers that open in less than two cycles for the power feeder protective device to supplant the conventional station circuit breaker. This would aid materially in coordination and, in addition, the benefits of high-speed fault clearing would be obtained and needless interruptions in service would be spared the majority of the feeder load for the usual fault where only one phase is involved.

In the following elaboration on the advantages of the higher voltage primary system, the data and conclusions are obtained from the studies made in Spokane and from the three-year operating record of the one feeder that has been described.

Lower Investment Costs

The major part of the primary system investment savings is due to the elimination of the conventional substation transformation to 4 kv., and, therefore, is dependent upon having a sub-transmission voltage level suitable for direct primary utilization. On this assumption, regulating and tap-off equipment as described, and of 3,000 kva. rating can be installed for $5/kva. less than the cheapest method of obtaining incremental 4-kv. capacity, and this saving is increased to $6/kva. if larger 13-kv. feeders or bus regulation are used. The saving may be as much as $15/kva. or three-fourths of the 4-kv. station cost when compared to the conventional 4-kv. residential station which is assembled on the job and is either totally or partially enclosed.

The reduction in primary feeder copper is large, both through reduc-



One-line diagram of 13-kv. feeder supplying 4,200 kva. of load. Fuse sectionalizing locations are shown as "MOT-150a" and effectively break up feeder into load groups of less than 500 kva.

tion in size and through elimination of duplicate circuits, and the saving in a new system slightly more than offsets the increased cost of 7,620-volt transformers and line insulation over the 2,400-volt class, each offsetting cost totalling about $2/kva. The saving is the greatest when the load carrying ability of the 13-kv. system is utilized to the utmost through maximum conductor loadings and feeder loads at least in proportion to the increase in voltage. This means steel or composite conductors for laterals instead of No. 6 copper, No. 6 to No. 2 copper for mains instead of 1/0 to 4/0, and feeder loads of 3,000 to 4,500 kva., instead of 1,000 to 1,500 kva. The primary system incorporates the simplest form of radial design, unencumbered by kickbacks, and does not require critical attention to load centers or location of the supply station. A primary system having somewhat better voltage characteristics will still usually result.

The entire saving in a new 13-kv. system for serving new developments is, of course, not achieved when additional capacity is obtained through converting existing 4-kv. primaries to 13-kv. operation. The cost of conversion can vary widely depending upon the extent of pole line rearrangement and the use made of the old 4-kv. copper, but generally the net cost of conversion including transformers and line insulation is about $4/kva. more than the cost of additional 4-kv. primary feeders. This offsets much of the saving made in station equipment, but a lower over-all cost is still obtained. In addition, the plant account of the 13-kv. primary system will be lower as a result of retiring much of the old 4-kv. system as contrasted with adding further to it.

Lower Losses

Actual primary feeder losses are greatly reduced even though conductors are more fully loaded. Added to this saving is the loss in the 13/4-kv. transformer station which is eliminated. Furthermore, while the location of the 13-kv. supply station is not critical and, if necessary or desirable, can even be outside the load area, it usually is near the center of the load area with the feeder branching at the station or close to it. Whereas, a 4-kv. feeder usually has to transmit all its load for considerable distance in one direction.

For rated load on the 13-kv. feeder the peak losses are only 1% from the sub-transmission system to the distribution transformer, amounting to an 80% reduction in the peak loss of a comparable 4-kv. primary system.

Annual energy losses are only one-sixth those experienced in a 4-kv. system. The peak loss saving when further increased by sub-transmission and transmission losses can have a value in power supply equivalent to several dollars per kva. in primary system investment, $5/kva. being a representative figure. In effecting economy, the reduction in losses is as large a factor as lower investment costs.

Greater Capacity

A large part of the inherently greater load carrying ability of 13-kv. primaries is made use of in eliminating duplicate circuits and kickbacks, and in serving much greater load areas with increased conductor loadings. This all contributes greatly to a much simpler and more economical primary system. However, the ratio between the loading abilities at 13 kv. and 4 kv. is so large that the 13-kv. system will still usually have considerable reserve margin for absorbing load growth. Further expansion of the 13-kv. system can be accomplished very economically when required since it is not necessary to extend additional facilities beyond the first branch location, which is usually at or near the regulating station.

The higher voltage primary system will be adequate to serve the prospective future residential loads in the order of 6,000 kwh. average annual consumption per customer, or even 12,000 kwh., which, served at 4 kv., would require a mass of feeders and substations. In fact, the area supplied by the feeder described has a present average usage per customer of 6,800 kwh. annually. Any plans for primary systems certainly should incorporate the ability to supply the larger average consumption which may be realized in the not too far distant postwar period.

Some advantage can be made of the low-voltage regulation between first and last transformers by increasing the allowable secondary and service voltage drop. This particular feeder has a spread of only 1¼% at peak load, and the volt or so saved over normal 4-kv. feeder design may well be incorporated in the service drops or the secondary. In fact, in several new housing projects supplied at 13 kv., a photograph of which is shown, two adjacent houses electrically equipped are supplied over a single No. 8 service drop.

Simplified Construction

The use of higher voltage for primaries makes possible the fullest use of simplified construction. Circuit congestion is greatly reduced and one voltage zone is completely eliminated. In accomplishing this, a multiple street lighting system is a desirable adjunct, making possible the complete isolation of the primary wire, thereby reducing the chance of conflict and resulting interruption to service. As much of the circuit length as possible should use a single phase-wire in pole top position. This coupled with vertical rack secondary construction gives a very neat and inconspicuous pole line as evidenced by the accompanying photographs.

Single-bushing transformers are mounted high and in line, and inexpensive suspension cutouts fill the primary gap without the use of crossarms. A two-core transformer in one tank has been developed and is being used for supplying three-phase four-wire loads. Streamlined construction has aided materially in obtaining easements along rear property lines so that all possible poles can be kept off the city streets. Attention to these basic considerations can forestall, perhaps indefinitely, public agitation for placing distribution systems underground. As a valuable counterpart, the utility makes use of a more economical type of pole line construction that can be maneuvered through trees quite easily. This makes possible lower operating costs and greater service reliability.

Lower Maintenance

The elimination of many circuits, close spacing and heavy corners, automatically means lower maintenance and operating costs. These costs are further lowered through the elimination of substation transformers and many sets of feeder regulators and circuit breakers. Hot-line tools are used exclusively in working 13-kv. primaries while energized, and the safety record has not been marred with a single accident.

The large reduction and simplification of circuits makes hot-stick work on 13-kv. primaries less costly than the use of rubber goods on more numerous and complicated and larger 4-kv. circuits. Tree trimming costs are also reduced since not as much trimming is required for the single primary phase-wire in comparison to the usual crossarm carrying 4-kv. and series street lighting circuits.

Improved Service Continuity

Use of the coordinated fuse-breaker protection scheme has proven so satisfactory that it should be an integral part of 13-kv. primary system design. The three-year record shows 15 instantaneous tripouts and successful reclosures, no branch fuse operation, and one five-minute lockout due to a truck boom coming in contact with the main feeder trunk and not getting in the clear immediately. This service record is equal to or better than that obtained on the average 4-kv. system, and further improvement is expected with the installation of the single-pole high-speed breakers previously mentioned.

A smaller amount of load is interrupted by a sustained fault on the 13-kv. system, anywhere except on the main feeder trunk, than that affected by a 4-kv. system sustained fault. One very definite hazard that invites a long interruption to service on the 4-kv. system is avoided through the elimination of the 13/4-kv. substation transformers. Should trouble develop in any of the 13-kv. feeder supply equipment, service can quickly be restored through the by-pass switch.

Simplified construction and the policy of isolating the primary wires as far and completely as possible are responsible partly for this good record. Trees have proven no particular problem and, although bare wire is used throughout on the primary system, no more emphasis is placed on tree trimming than in 4-kv. areas. There have been no cases where the high-voltage primary wire has been damaged or a protective device has operated through a contact of the primary wire alone to a tree. No case of the primary wire being down has been experienced, but more prompt and reliable fault disconnection and less burndown should be obtained at the higher voltage than at 4 kv. Moreover, hazard to public safety should not be increased. The 7,620-volt single-bushing transformers have shown a splendid performance record with very few cases of blown fuses occurring during lightning storms. The fact that the transformers are mostly new probably attests to the value of "coordinated insulation." Standard transformers and no lightning arresters are used. To date no transformer damage has resulted.

Greater Flexibility

Anyone familiar with the periodic and frequent rearrangement of primary feeders that is necessary on a 4-kv. system will welcome the greater flexibility of the 13-kv. primary system. Phase balance is not upset by small load changes as at 4 kv., and voltage drop ceases to be a source of concern. Load carrying ability is about the only consideration that need be watched. The 13-kv. system is capable of serving directly fairly large concentrated loads and large motors that commonly have to be segregated on special power feeders at 4 kv. The location of the 13-kv. supply station is quite flexible, as contrasted to the exacting requirements for locating the 13/4-kv. substation, and often times it is possible to utilize present substation sites or out of the way lots that do not invite public objection.

Discussion on Spokane 13-kv. Primary

SEVERAL prominent distribution engineers were given an opportunity to preview the article on the 13-kv. Spokane distribution system by M. F. Hatch and were asked to submit a discussion.

Following is the statement made by M. T. Crawford, chief engineer of the Puget Sound Power & Light Co.:

THE trend toward higher primary feeder voltages is a move in the right direction, where conditions are right for it. Conditions on Puget Sound differ from the usual in certain respects, such as, for instance, the necessity of meeting extensive competition. This has been done by, among other things, providing a superior service continuity along with distribution economy. Therefore, conditions are not considered right for the use of higher voltages if service continuity is in any way impaired.

The general basic idea we have in mind is to maintain the necessary high standards, and achieve the correct balance between immediate economy and reasonable provision for future growth. In general, it does not pay to make extra investments too far ahead for problematical future need. The fixed charges on any investment will reach a cumulative total of 100% within about eight years, and this fact, together with the uncertainty regarding future changes in load density, make it inadvisable to build distribution systems for future conditions which are not in the picture for the next five years or so.

Another general consideration is the very substantial increase in the unit labor costs applying to construction in the field, whereas copper and material costs are fairly well stabilized. For this reason an over-all design which makes more liberal use of materials and prefabricated devices will be given preference over one which uses more field labor to save materials.

In the case of heavy-duty underground distribution, for instance, a 13-kv. primary voltage has been used on new area extensions, as in this case service continuity is fully protected by inherent design features of the a-c underground network system. In the case of urban residential distribution, however, there are no load densities now in sight, even with high range and water heater saturation, which justify the installation of network protectors and multi-feed designs. In order to provide the necessary superior continuity for this type of service, the company engineers developed a 4-kv. system design which applied networking and gridding principles, and which 20-year experience has shown is inherently self-clearing of circuit trouble and transformer burnouts.

A 12-kv. primary system can not be designed with inherent burnoff characteristics and self-clearing features. Since a very large area must be served by one feeder in order to realize the copper economy resulting from the higher voltage, every case of line trouble results in an outage to a large number of customers. While loop construction with sectionalizing fuses or circuit breakers can be used to reduce the size of the service interruption area, a 4-kv. network which burns off its troubles has practically no service interruption area.

In our operating area, tree interference is a major problem and in urban areas ornamental trees cannot be cut without serious public protest. Our practice is to install tree wire, which at 4 kv. is fully adequate and makes trimming unnecessary.

Our state law requires a 7-ft. spacing between 12-kv. primary circuits and secondary circuits, whereas only 3-ft. spacing is required where the primary circuit is 4 kv. Line transformers and accessories are substantially more expensive for 7.2 kv. than they are for 2.4 kv. Rubber protective equipment is fully satisfactory on 4-kv. circuits, but the higher voltages, particularly in the rainy winter climate west of the Cascade Mts., cannot be safely handled with rubber protective devices and it is necessary to use hot-stick tools or de-energize the circuits with consequent increased labor costs.

In view of the above considerations, our practice favors 4-kv. systems for urban residential distribution under our conditions. Increased load densities will be met by extending the use of gridding and networking principles, and with primary overhead networks superimposed on existing radial systems.

Many rural areas on Puget Sound have load densities approaching suburban conditions with from eight to twenty customers per mile. Here a 7/12-kv. primary voltage has been standard practice for many years, as the distances are beyond economical distribution at 4 kv. By carrying trunk feeders through from one substation to another, with sectionalizing switches, switches and reclosing breakers or fuses on branch lines, adequate service continuity can be obtained.

Following are comments made by S. J. Lisberger, chief of the division of steam and distribution engineering, Pacific Gas and Electric Co.:

THERE is no doubt that the growth of load in certain areas will require the transmission and distribution of energy at voltages higher than those used in the past. In fact, many companies have for some time been extending the 12-kv. system into those areas formerly supplied at lower voltages. The electric distribution system in such areas was largely in nominal 4-kv. Y-connected systems using 2,300-volt transformers connected between line and neutral. The 12-kv. system will undoubtedly be similar in character, except that the transformers will have a correspondingly higher Y voltage.

The feasibility and economic justification for the extension of such higher voltage systems will depend largely on the density of load in the existing area, the amount of plant involved, the type of construction, the age of the plant and similar correlated factors. If the present plant be of large size and the area will not apparently grow greatly in density, it may be advisable to extend the 4-kv. system by means of feeders supplied from already existing stations. Another solution is to establish zone substations supplied, say at 12 kv., the capacity of the unit to be on the order of 2,500 kva.

Or again, a compromise solution might be reached by building an automatic substation, say with two units, the station to have total capacity on the order of 8,000 kva., this type of station being what might be termed a compromise between the zone substation and the older type of regular substation. The transformer units in such a substation would have self-contained regulation with two feeders per transformer unit. Such type of substation has worked out quite economically where the existing plant was fairly new and load density of a high order.

No definite statement can be made as to which is the most advisable form of the three above mentioned solutions. If the distribution plant is fairly new and there are a large number of joint poles with suitable spacing between the power conductors and the telephone conductors for 4 kv. but too little for proper separation at 12 kv., the economic solution may be entirely different. The rate of load growth also has a decided bearing on what should be done.

It is not always possible to substitute a 12-kv. circuit for one of lesser voltage as the clearances are often determined by state regulatory orders

and the costs of changing pole and wire facilities may not justify the advantages to be gained from higher distribution voltage. The common neutral system again is a matter of economics and the costs of such a system are again affected by state regulatory laws as well as the necessary precautions that must be taken for safety.

My company has all three types of the above mentioned systems in operation and each system that has been adopted has been carefully studied in order to determine what was the most economical method for the territory involved. Mr. Hatch has described very clearly a high-voltage distribution system which should give good service with a minimum of trouble.

Discussion by M. M. Koch, superintendent, electric distribution Public Service Company of Colorado follows:

THE proposed expansion of the 7,620/13,200 Y-volt distribution system in the City of Spokane may well be economically justified in view of the load densities anticipated in the residential areas, but it is doubtful if a similar system can be justified in lower density areas. However, the detailed performance of this system will be watched with interest by distribution engineers throughout the country.

It would seem that as the system gets larger and larger, certain details in the design will require reconsideration, and perhaps, modification, particularly if serving 40% of residential load is attained. The proposal to tap the 13-kv. network circuit at various points without providing automatic sectionalizing at the tap points would appear to require further consideration. Assuming that two or three of the proposed six areas are supplied from one such tie circuit, an interruption to service to a too large proportion of the residential load would occur when such circuit runs into trouble, and to avoid this either circuit breakers will have to be added to these tap points, or else the 13-kv. residential circuits will have to be extended to originate at one of the major substations.

The proposal to use steel or composite conductor for laterals instead of small copper would appear to be a step in the wrong direction, unless high-strength conductor is necessary because of span lengths employed. The losses resulting from the use of steel conductor for the loads proposed could easily upset the economies of the scheme, to say nothing of the undesirability of mixing various types of conductor on a single pole line and the problems relating to hot-line tools when special conductors are employed.

It is debatable if the actual operation and maintenance costs, particularly with respect to tree trimming, will be materially reduced with this system over a 4-kv. system employing the same general type of construction outlined by the author.

If the load densities and high usage are attained, load unbalances might become serious. From the standpoint of balance and particularly with the load densities anticipated, it might be more economical to supply the entire area at 4 kv. on a three-phase rather than a single-phase basis, utilizing three-phase, four-wire Y secondaries. There is also the possibility that as residential loads increase, it will be more and more likely that three-phase service should be supplied, and here again, the economies might well dictate use of a 4-kv. system.

I do not agree with the author for a number of reasons in his statement that this system is more flexible. One very good reason is the ease of working on 4-kv. lines in a normal manner, whereas with his proposal, hot sticks are necessary and these, at best, are necessarily slow and inconvenient.

From numerous analyses and studies that we have made in the past, we have found that from the standpoint of economics there is very little difference, perhaps 10%, in the cost of distribution systems at different voltages. In order to get a true comparison it is necessary to design a complete system utilizing several voltages. The choice of voltage, therefore, usually boils down to a decision as to whether it is better to have larger conductors and lower voltage equipment, or higher voltage equipment and smaller conductors in relation to the probable operating difficulties and operating costs that will arise as a result of the voltages employed.

In order to present a full and complete discussion of the pros and cons of 11-14 kv. distribution, the author of the Spokane article was given the benefit of objections raised in the foregoing comments as well as points brought out in the questions and answers on page 64, and was asked to submit a rebuttal discussion. Mr. Hatch's reply follows:

THE questions you have raised were not unexpected as they are present whenever the subject of 13-kv. primary distribution is discussed. In fact, they proved the most bothersome to us at the time we were considering trying out the higher voltage distribution system. It is recognized that there is a voltage dividing line in most state construction laws that applies to both physical clearances and to safe operating practices. This dividing line is 7,500 volts in the State of Washington, though it is 5,000 volts in many states. There is, of course, considerable inertia to be overcome, especially in the line crews and operating staffs, in embarking on a higher voltage system after so many years with the accepted 4-kv. conventional system. However, I would like to point out strongly that most of the troubles that we anticipated at the beginning have proven to be in the anticipated class only, and that very few have turned out to be actualities. After three years of operation with a good-sized 13-kv. primary area, our linemen and operating staffs favor the higher voltage.

In regard to working on 13-kv. primary lines while energized, our experience has been quite favorable in comparison with the ordinary 4-kv. distribution. While there is at least one company in the South that uses rubber goods for working lines carrying this voltage, most companies will probably wish to use hot-line tools exclusively for this class of work. This is the practice of the Washington Water Power Co., and there is no doubt but what our maintenance and operating costs are lower per kva. than those on a 4-kv. system. This is true for two main reasons, first, much less over-all maintenance is required because of fewer circuits and smaller wires that are used on the higher voltage system, second, because of the great simplification and reduction in the number of circuits and wire sizes. For these reasons the time spent in hot-stick work is usually less or at least comparable with the time spent in covering up the more numerous 4-kv. lines with rubber goods. We have had no occasions where the necessary maintenance and construction work could not be performed satisfactorily on the energized lines, and up to date, the safety record has been unmarred by accident.

The point raised in regard to additional pole height being required to accommodate the higher voltage primary might be legitimate where the old style practice of mounting transformers below the secondaries is still in vogue. However, where it is the practice to mount the transformer above the secondary, sufficient pole space must be allowed for this purpose, so generally the required clearance between secondaries and the higher voltage primaries is usually provided as a matter of course. Our standard pole construction, where space is provided for joint use with the telephone company, specifies a 40-ft. pole and allows in the order of five to seven feet above the secondaries to the top of the pole to accommodate distribution transformers up to as large as 50 kva. the majority of the pole lines in these higher voltage areas consist of 40-ft. poles, with some 45-ft.

poles also used. The construction has been quite satisfactory, and only in the exceptional instance of a company using a 35-ft. pole as a standard should conversion to higher voltage primary require additional pole heights and extensive pole rearrangement.

Where provision is made for mounting standard distribution transformers above the secondaries, there is usually room to accommodate the two-unit, three-phase transformer, since generally, the case is only about one foot longer than a single-core transformer. Too, the case is so slim that often times it is possible to slide it down on the pole past the secondaries by using rack extensions.

Through-bolt mounting of transformers naturally produces transformer case extension on the opposite side of the pole, which might be considered a pertinent factor, especially when the transformer case is grounded. There are no regulations in the State of Washington which require that this bolt be covered, but in some cases we have deemed it advisable to do so. We have worked out a very simple and inexpensive method of doing this in using an 8-in., one-half section of 3½-in. fibre duct and lagging it onto the pole over the through-bolt with one lag screw.

It is hoped that these are sufficient answers to counteract the doubts of those who are hesitant in going to higher voltage distribution systems, and since experience is the best answer to these questions, we are becoming stronger high-voltage enthusiasts constantly as our experience accrues.

Puget Sound 4-kv. Primary Network

C. F. Myers
Puget Sound Power & Light Co.

SEVERAL years ago, the Puget Sound Power & Light Co. made an engineering and economic study of its overhead distribution practice in serving city and suburban residential areas, and of new distribution practices being employed, or considered, by several other utilities. The objective was to employ a system for lighter load density suburban areas which would be initially low-cost, could be economically expanded and which would provide continuity of service comparable with that provided in the urban areas.

It had been, for many years, the company's practice to employ relatively high-capacity automatic 4-kv. substations supplied by two or more high-voltage circuits, for high load density urban areas. Individually regulated, 2,400-volt, single-phase feeders supplied lighting primaries. The use of system-wide common neutral resulted in partial neutralization of the zero-sequence currents in the field, and, in effect, an approach toward three-phase, 4-kv. distribution insofar as, at least, the "express" portions of feeders were concerned. All 120/240-volt lighting secondary, No. 4 copper, supplied by a single feeder, was solidly gridded. Likewise all primary, single-wire, No. 4 copper, was solidly gridded and line transformers extensively banked. This resulted in economical use of transformers, good voltage regulation and good continuity of service.

The primary network scheme seemed to be a solution to the quest for an economical, easily expanded system providing reliable service, and the first unit of such a system, now having a capacity of 17,900 kva., was inaugurated a few years ago.

The substations, the wiring diagram of which is indicated in Fig. 1, in general, consist of the following elements:

Primary disconnecting switch and fuses.

Three 1,000-kva., 13,200/2,400-volt transformers.

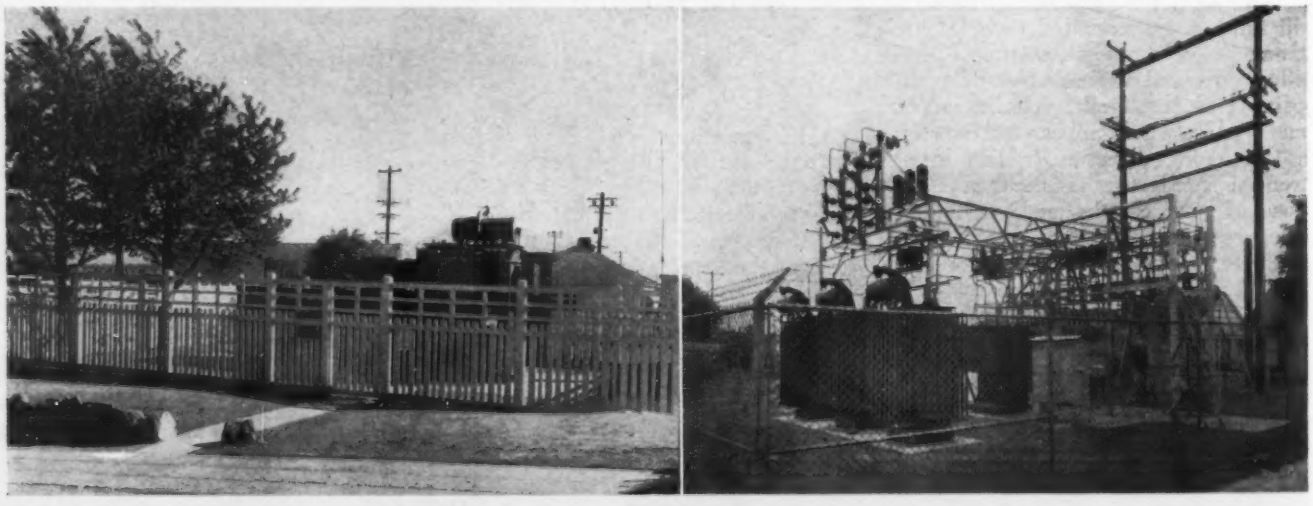
300-kva., 4,160-volt step voltage regulator, with 32, ⅝% steps.

Bank secondary oil circuit breaker (50,000 kva.)

Two to four feeder oil circuit breakers (50,000 kva.)

The feeder oil circuit breakers are provided for opening on overcurrent and automatic reclosure. The transformer bank secondary oil circuit breaker is provided for opening on reverse power and automatic reclosure on restoration of transformer secondary voltage of proper magnitude and phase sequence. In case of a 4-kv. bus fault or failure of a feeder oil circuit breaker, relays set to operate at high current will open and lock out all oil circuit breakers.

Except for one factory-built substation and one temporary structure, the



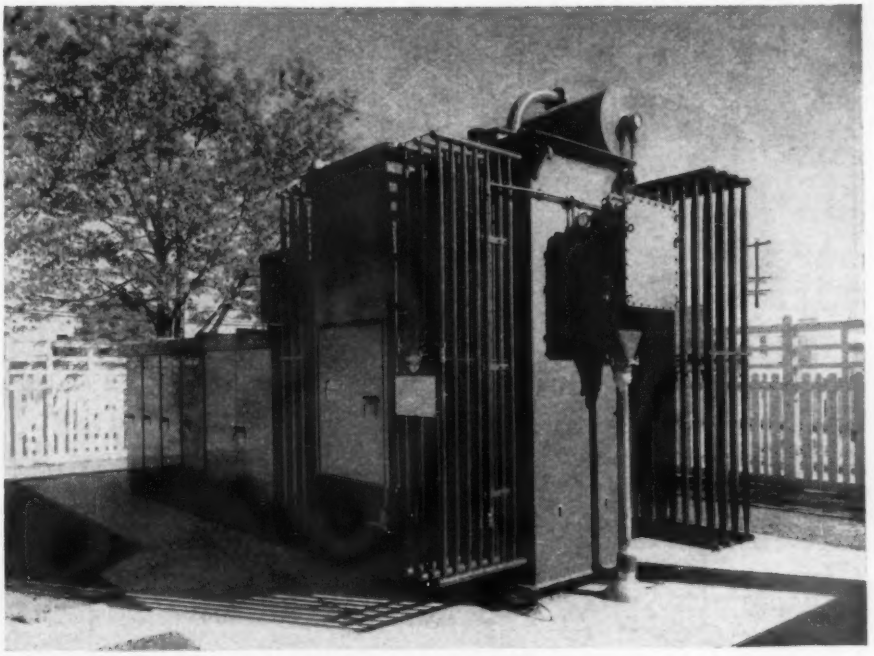
Striking comparison between metal-clad unit substation (left) and built-up type (right). Capacity 3,000 kva. each

steel frame fabricated substations are of standard design which, in itself, has resulted in lowered engineering and construction costs. They were designed for ultimate replacement of the 50,000-kva. oil circuit breakers with those of 100,000-kva. capacity.

The substations are interconnected by means of 4-kv. primary mains of No. 2/0 copper gridded to primary grids of No. 6 copper. Each primary main is terminated at two substations, at a feeder oil circuit breaker at each. Each substation is fed by a single 13-kv. supply. A total of six 13-kv. circuits is now supplying the network, and all of these circuits supply, in addition, radial substations in the area adjacent to the network. This makes it possible to open any 13-kv. supply line or interrupt operation of any substation without interfering with the operation of the network or seriously overloading any network substation transformers. A fewer number of 13-kv. circuits could have been employed successfully but six circuits were already available in the area converted to network operation and, of course, the greater number of circuits provides safer operation.

Provision is also made for connecting the network to large radial substations by means of primary mains terminated at the network substations in the same manner as other primary mains, and at the radial substations by means of oil circuit breakers relayed to open on power inflow to the 4-kv. bus. Each primary main terminated at a radial substation is to be provided with an individual three-phase regulator installation. Fig. 2 indicates the layout of substations, primary mains and three-phase primaries.

Negative reactance compensation is used to protect against instability which would otherwise result from parallel operation of regulators. This merely involves reversal of the polarity of the reactance element of the line drop compensator of each regulator. An outgoing circulating current (which is of low power factor) then results in a droop, instead of the normal rise, in the regulator voltage. The required line drop compensation and over-compensation is provided by the resistance element. This amounts to sacrificing the ability of the compensator to provide exactly the voltage required at all power factors for its ability to provide the required stability and the desired voltage at only one predetermined power factor. This sacrifice, however, has resulted in no operating difficulties.



Unit network substation (above) with 3,000-kva. 13/4-kv. transformer, tap changing voltage regulation, 4-kv. bank breaker and four 4-kv. feeder breakers

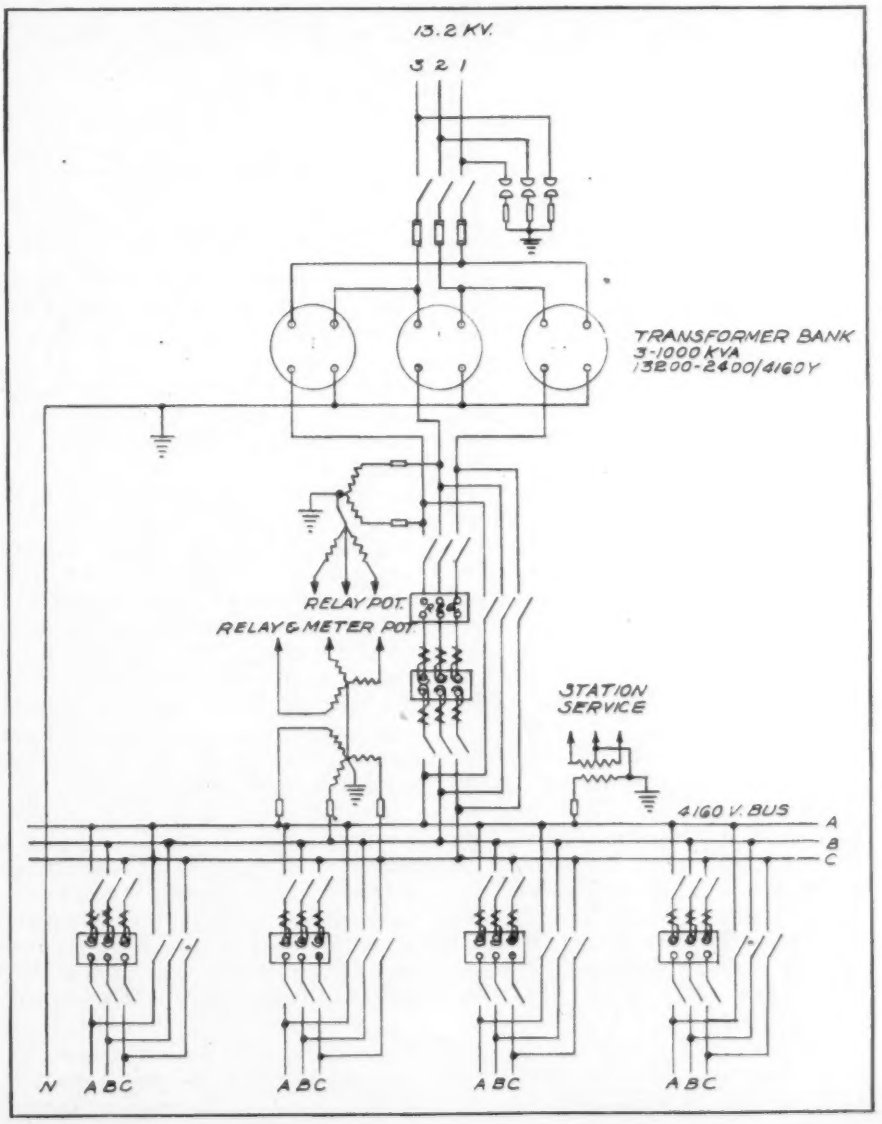


Fig. 1. Wiring diagram for 13/4-kv., 3,000-kva. primary network substation

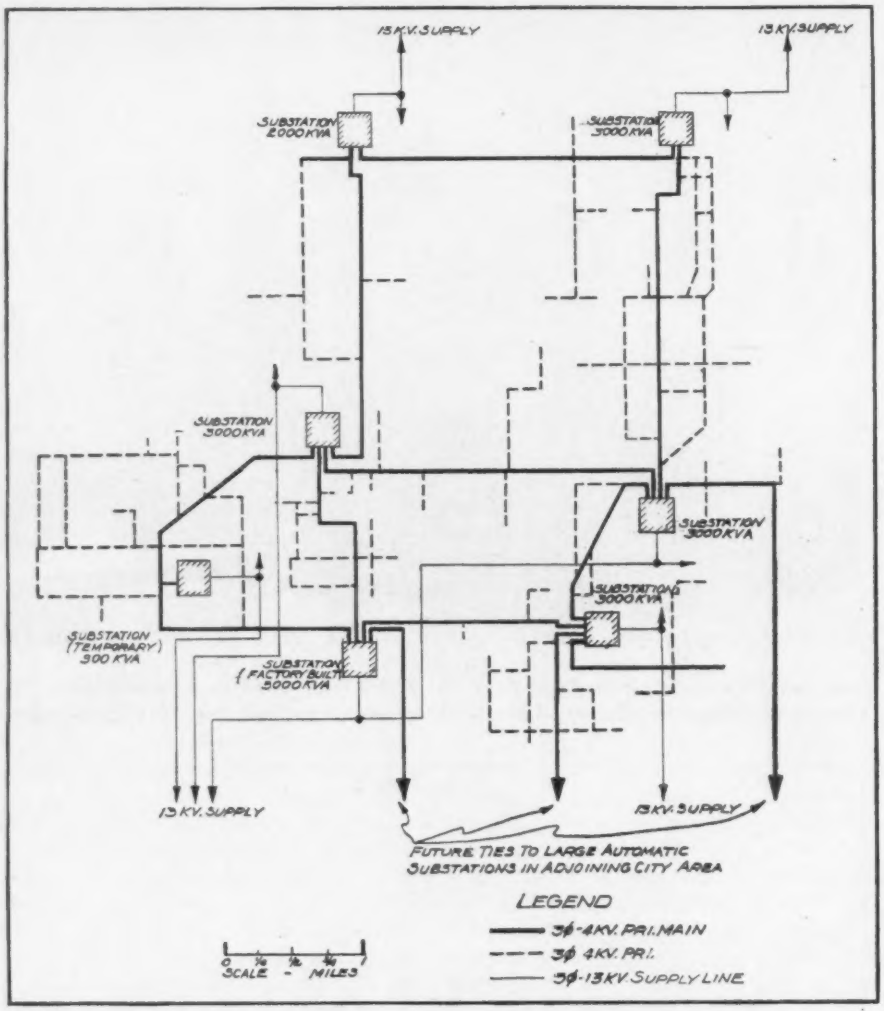


Fig. 2. Substations, 13-kv. supply lines, primary mains and three-phase primaries of 4-kv. primary network

The network scheme adopted by the company follows conventional patterns with one exception. In order to retain the highly desirable feature of secondary gridding developed for the radial system and described in the foregoing, each primary main area (that area supplied by one primary main) is broken down into 6 to 15 single-phase areas consisting of grids of one-wire, No. 6 copper primary and grids of three-wire No. 4 copper secondary. These single-phase primary grids are superimposed on a three-phase "back bone" grid consisting of the primary main and the No. 6 copper three-phase primaries. This results in very appreciably supplementing the primary main capacity, by not only No. 6 copper, three-phase primaries, but by single-phase primaries as well. As the network develops, it is expected that the primary mains can be reduced in gauge, except for short distances near the substations. Actually, greater economy will result from the use of multiple paths of small-gauge primary, rather than a single path of large-gauge primary.

The method of arriving at the most economical capacity and spacing of the substations is quite simple, as the network lends itself easily to economic analysis. First a maximum primary voltage gradient allowable was established at 3%. An equation was then set up indicating investment in incremental primaries and in substations per kva. of load distributed at 90% power factor, as function of load density. Equating the first derivative to zero gave the most economical capacity and spacing. Discontinuities introduced into the substation cost term of the equation, by the necessity of using costs of apparatus of standard ratings, had to be reckoned with but presented no serious difficulties.

Several years operating experience has been obtained. No interruptions in service have resulted, although many primary faults have occurred. No feeder breaker has yet locked out, and very little breaker operation has been experienced. Due to sufficiency of short circuit capacity, which is inherent with the network, practically all No. 6 copper primary faults are burned clear without oil circuit breaker operation. Voltage regulation is very satisfactory.

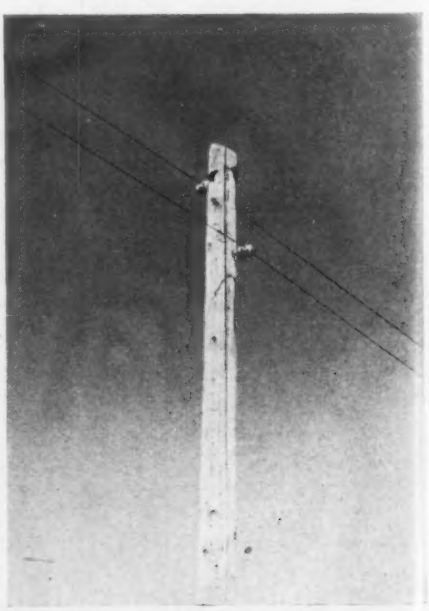
Low-Cost Rural Lines

Minimum of hardware used in construction

TO meet the need for low-cost construction for sparcely settled rural areas, Southern Colorado Power Co., Pueblo, Colo., has developed a type of construction with an absolute minimum of hardware. As shown by the accompanying photograph, the conductors of a single-phase, 2,300-volt line are mounted on porcelain spool insulators attached to the pole 2 ft. apart on opposite sides by brackets. The insulators are white secondary spools No. 320W, made by the Knox Porcelain Co., and the bracket is Joslyn No. J2395, or similar.

Thirty-foot poles with 6-in. top are used, set 4½ ft. in the ground. Spans are 400 ft. or longer with No. 6 Copperweld wire. Tests made on a typical pole top show a dry flashover of 20,000 volts and wet flashover of 10,000 volts. E. B. Hornbaker, superintendent of lines for the company, says of this construction: "When we built this line in 1937, some of us thought these insulators would give trouble, if nothing else they would cause radio interference, but after seven years we have had no insulator trouble or, for that matter, any other trouble. So long as it works and serves the customer satisfactorily, what is wrong with it! Maybe one reason why we haven't more rural customers is that we have been trying to build too good a line for the service it has to render."

Typical bracket bolt construction job



Postwar Distribution Planning

Prominent Western distribution engineers express their views and reveal postwar planning in answers to questions submitted by Electrical West. Higher voltages and unit substations favored

WITH war production already beginning to taper off, distribution engineers of the West are concentrating thinking and planning more and more on the problems that will confront them postwar when they will be called upon to handle greatly increased loads. What changes will have to be made in distribution systems of the West to handle 1,500,000 kw. of additional load? Will higher voltages be the answer or will the pattern of present systems be retained and additional capacity gained by adding more copper and more substations? These are fundamental questions that the distribution engineer must first decide.

Some very interesting comments on unit vs. built-up substations, new equipment, pole mounting of transformers, new wire coverings, rural construction and other points will be found also in the following answers to questions. Representative Western distribution engineers asked to participate in the discussion are listed with title and company affiliation in the accompanying box. Questions asked by ELECTRICAL WEST are printed in bold face type and answers identified by the last name of the engineer follow:

DISTRIBUTION engineers are seeking design economy in urban and rural line construction costs, while at the same time they expect to serve considerably higher load densities in the future. What are your ideas and plans looking to solution of these problems? It would be well to state briefly what kind of a major distribution system you now have (4-kv. primary radial, with or without common neutral, banking of transformers, loads per feeder, etc.).

Lisberger—The major distribution system of Pacific Gas and Electric Co. varies in type with the territory served. In the metropolitan areas in heavily loaded underground districts, a low-voltage network system with 120/208 volts secondary, four-wire, supplied from a 12-kv. system is already in use. This system is being extended as fast as load growth requires. In industrial districts in similar areas, the major distribution system is largely a 12-kv. radial system. In the residential areas, the system is largely 4-kv. radial primary. There are some common neutral systems in the territory. In the agricultural area most of the system is supplied with 12-kv. radial feeders. In some of the older areas there is some 4-kv. supplied, but this is gradually being reduced and the additional load is being taken on at 12-kv.

Jung—The 4-kv. radial feeder system is generally used throughout our system. Several years ago we installed common neutral systems at five locations. As far as we can determine, there is no great amount of saving possible and the requirements of regulatory agencies, when coupled with the comparatively poor ground conditions, make this scheme impractical from our point of view.

Generally, our present 4-kv. radial feeder system is designed for 200 amp. per circuit, using 2/0 copper. Greater loads are impractical because of increased voltage regulation. This regulation cannot be offset by the use of larger copper because the reactance voltage drop increases out of proportion to the decrease in resistance drop.

We have considered banking secondaries in residential areas, although experimental installations have not indicated an appreciable saving could be made in transformer capacity. There are two deterrents to banking transformers which are the requirements for secondary fusing and the hazard to linemen in case of a feedback through the primary of a transformer.

Schoolfield—Our present distribution in larger towns is 2,300 volts delta with radial feeders, while in the smaller towns we use 6.9-kv. delta with radial feeders, also to some extent 12-kv. Y radial feeders with common neutral. In rural areas our standard has been 6.9-kv. delta and 12-kv. Y, mostly with common neutral. We do not follow the practice of banking transformers. Loads per feeder range up to 2,000 kw.

Purton—Primary distribution voltages used on the Utah Power & Light system are 2.4, 4.16, 5.2 and 12.5 kv. The 2.4 kv. is used in the older distribution systems and in some of the smaller towns. In the larger cities 4.16 kv. is used. The 5.2 kv. was the voltage first used by one of the predecessor companies. On all rural circuits 12.5 kv. is used. It is expected that in time the distribution systems in all the smaller cities and towns will be converted to 12.5 kv., leaving in use only the two voltages, 12.5 kv. and 4.16 kv. We expect to use 12.5 kv. in some of the larger cities where the load density is greater or where there are a limited number of streets on which distribution circuits can be built and where tree conditions are not too severe. Load on 4-kv. feeders is generally limited to approximately 2,000 kw. per feeder. On 12 kv. it is limited to 5,000 kw. per feeder.

Halpenny—In the past we have made rather general use of 2.3-kv. and 4-kv. four-wire distribution, but of late years, have employed 4.8-kv. delta. We use radial primaries and have but a very limited amount of distribution where the common neutral is employed, in fact, only a portion of one community is so served.

Wakeman—At present our main underground and overhead distribution system consists of 4-kv. primary radial feeders with common neutrals, with our larger industrial loads supplied from 11 kv. and in a few instances from 57 kv. The normal load carried

Symposium Panel

S. J. Lisberger, ***chief of division of distribution and steam engineering, Pacific Gas and Electric Co., San Francisco.***

H. E. Jung, ***distribution engineer, Southern California Edison Co., Los Angeles.***

H. H. Schoolfield, ***general superintendent, Pacific Power and Light Co., Portland.***

T. A. Purton, ***chief engineer, Utah Power & Light Co., Salt Lake City.***

R. H. Halpenny, ***chief engineer, California Electric Power Co., Riverside.***

H. R. Wakeman, ***superintendent of distribution, Portland General Electric Co., Portland.***

O. L. LeFever, ***general superintendent, Northwestern Electric Co., Portland.***

J. E. Emery, ***ass't electrical superintendent, Idaho Power Co., Boise.***

K. B. Ayres, ***superintendent electric transmission and distribution, San Diego Gas & Electric Co., San Diego.***

H. H. Minor, ***distribution engineer, San Joaquin Division, Pacific Gas and Electric Co., Fresno.***

M. M. Koch, ***superintendent electric distribution, Public Service Company of Colorado, Denver.***

V. B. Jones, ***engineer, Tacoma City Light, Tacoma.***

M. T. Crawford, ***chief engineer, Puget Sound Power & Light Co., Seattle.***

M. O. Bolser, ***engineer of design, Los Angeles Department of Water & Power, Los Angeles.***

M. F. Hatch, ***electrical engineer, Washington Water Power Co., Spokane.***

on 4-kv. feeders is in general 200 amp. On the underground system the larger portion of it is networked on the secondary side, and on the overhead system we bank as many as three or four transformers.

LeFever—Our present distribution system consists of 11-kv. feeders and 2,400-volt radial primaries. Up to five transformers are banked together in the residential districts. A portion of our underground system is 11 kv. and we also have isolated cases of 11 kv. in the rural districts. Most of our 2.4-kv. feeders are loaded to 400 amp., or 8,000 kva.

Ayres—We use a 4-kv. primary radial system without common neutral and no banked transformers. Feeders are loaded to 200 amp.

Emery—At the present time, practically all our city load is served at 4,150 volts Y. It was formerly our belief that higher voltages would be impractical due to tree conditions and other imaginary difficulties. However, we have completely reconstructed one town and partly another, on which we have had some three years of operating experience. Actually, we have had much less tree trouble and other difficulties with the 12.5-kv. system than we had with the 4.1-kv. system. We have generally adopted the practice of interconnecting the primary and secondary neutral. We have not as yet started the banking of secondaries. However, this appears to have considerable promise and we are giving it further study.

Minor—Our major distribution is 12-kv. radial for rural areas, the smaller towns and fringe areas of our larger cities. At present, we use 2,400 volts for congested areas of those cities, but contemplate conversion to 4,160 volts Y as a postwar project.

Koch—We now have quite a variety of sub-transmission and distribution voltages in our various districts throughout the state, such as 2.3, 4, 6.9, 11, 12, 13.8, 16.5 and 22 kv. In Denver our basic distribution voltage is 13 kv., at which we supply some of the larger industrial loads, some of the sparsely settled rural and fringe areas, the underground 120/208-volt network in the business district, and numerous 13/4-kv. substations. Insofar as design is concerned, our present standard is to use no conductor larger than 4/0 on our overhead distribution, largely because of the guying problem. Feeders in Denver are 4-kv. radial with common neutral and normal full load of about 1,440 kva. It has been our practice for years to bank transformers with a fuse in the secondary at the mid-point between units and to limit the size of secondaries to No. 4, except in areas of heaviest load density. Our policy has been to use more small transformers rather than larger transformers and heavier secondaries. In the commercial areas we are employing three-phase, four-wire secondaries wherever possible on the overhead system, and expect to expand this system as rapidly as possible. I believe that shunt capacitors, in addition to voltage regulators, will be utilized more and more as systems grow, because of the improved voltage regulation that will result.

Jones—Our present primary distribution is three-phase 4-kv. star without common neutral in the City of Tacoma. Outside the city we use three phase 4 kv. with no neutral. Three transformers are commonly banked, and sometimes four, but more than this causes difficulty in re-fusing.

Crawford—Our practices relating to distribution call for several different general types of construction. For the heavier load centers of large cities our standard is low-voltage, a-c underground networks, using for the older installation 4 kv., and for newer extensions, 13-kv. primary with 120/208-secondary. For heavy industrial areas, 11-13-kv. radial primary feeders with transformation direct to service voltage are used. For urban residential areas, a 4-kv. primary voltage is used with radial trunk feeders from fully automatic substations, supplying a completely gridded primary and secondary network of local mains in the load area with distribution transformers extensively banked together. In lighter load density, outlying urban areas, newer extensions have used an overhead primary network with tie-mains between unit substations, supplying a similarly gridded type of local distribution in the load area. For rural distribution the 11-13-kv. star system is used with 7-kv. distribution transformers on radial feeders.

Bolser—With the exception of about 20% of our system acquired by purchase in recent years, all of our primary distribution has been 4,800 volts delta for many years.

DO you favor higher distribution voltages (11-14 kv.)?

Hatch—Yes, as indicated by my article on the Spokane 13-kv. distribution.

Lisberger—We have favored a higher voltage distribution system for many years and in this area such system is operated at 12 kv.

Jung—In urban, residential and business areas there would seem too little to be gained by going to higher than 4-kv. Y or 4.6-kv. delta. In dense load areas there is the possibility of networking the 4 kv., although in one area where we have considered this scheme it could not be justified economically when compared with the alternate 4-kv. radial feeder system which is generally used throughout our system. Industrial areas sooner or later will require higher than 4 kv. Because our transmission system is 66 kv., it is most practical to serve large blocks of power at this voltage, and in the majority of our industrial areas we now serve intermediate loads at 6.9, 11.5 or 16 kv. In this connection it would be desirable if more high-voltage joint occupancy with communication utilities could be used.

Schoolfield—Yes, we favor higher distribution voltages of the 12-kv. class.

Purton—We favor a distribution voltage of 12.5 kv.

Halpenny—There undoubtedly are many advantages in the use of distribution voltages in the 11- to 13.8-kv. class. However, we employ but a limited amount of 12 kv. In converting a 2,300-volt distribution system to a higher voltage, a change to 11 kv. and higher is often found to be much more expensive than a change to a voltage such as 4,800, owing to the greater amount of reconstruction necessary in the case of the higher voltages. For this reason, and also for the reason that our safety rules permit the handling of anything below 5,000 in the same manner as 2,300-volt circuits are handled, we have been inclined toward the use of 4,800 volts as necessity arose for distribution increases.

Bolser—We have not given consideration to increasing our 4.8-kv. primary system voltage. For many years we have used a 34.5-kv. peddler system for providing service to large industrial loads. The value of this system has been well demonstrated during the war as we have been able to serve about 60% (exclusive of rubber and aluminum loads fed by 132 kv.) on the 34.5-kv. peddlers without affecting our normal distribution station or primary feeder capacity.

Wakeman—In the future, many of our 4-kv. feeders may be increased to carry 300-400 amp., and with higher load densities, we will be forced to additional substations and feeders. We are inclined to favor higher distribution voltages of from 11 to 14 kv., and believe that we will come to such distribution as our load increases.

Ayres—We do not favor higher distribution voltages at present.

LeFever—I have arranged with one or two distribution engineers from the Electric Bond & Share Co., who will associate with our own engineers, and make a complete study of our distribution system, after which our future procedure will be decided. I do not care to make any positive statements until this study is complete, but would make a guess that in the city of Port-

land we will go to 4.16-kv. Y, with a common neutral and will supplement this with 11-kv. distribution for new additions on the outskirts of the city, and that the 11-kv. system will gradually grow back into and absorb the ends of the 4.16-kv. system. Of course, our study will include consideration of a network system as now used by the Puget Sound Power & Light Co., but I am of the opinion that unless there is considerable economy I would not be in favor of the latter system.

Emery—As previously stated, we very definitely favor the 12.5-kv. star voltage for general distribution use. It is not our plan to add any additional substation capacity for 4.15-kv. feeders and all new construction, both urban and rural, will be on the basis of 12.5 kv.

Jones—We do not favor higher distribution voltages inside the city as there are too many trees and alley construction. There are too many trees outside the city, also. Our present practice is to run 55 or 13 kv. from main stations inside the city to some 4-kv. load radiating point, and then step down to 4 kv. Telephone station protection is now good for only 5 kv., and inasmuch as we have probably 70% joint construction with the telephone company, a higher voltage such as 6.6 kv. or 13 kv. would not be permissible.

Minor—Yes, we favor higher voltage for all distribution, except in cities.

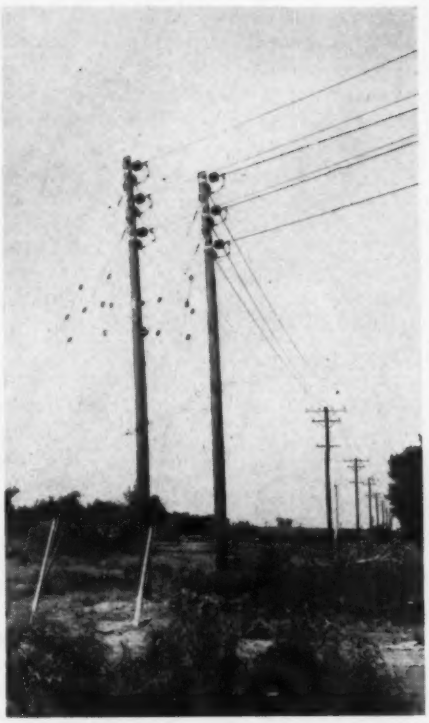
Koch—We do not plan in the immediate future to change any of our existing system to higher distribution voltages in the 11-14 kv. class. We have some 6.6-kv. rural lines which might some day be converted to 12-kv. Y, but we do not see the need of such a move at the present.

OR, are you going to stay with your present system and handle additional load densities with more feeders, more copper and more substations?

Schoolfield—We generally favor higher voltage for handling higher load densities. Some situations may require additional feeders, some feeders may require larger copper in spots. Additional substations are mainly dependent on development of new load areas.

Purton—As load grows it will be necessary to add new substations and more feeders.

Lisberger—In a system as Pacific Gas, and with a diversified type of community, no general statement can cover how the system growth will be handled. The type of community, type of load and existing system determine, in part, what should be done in handling new loads. It is most probable that there will be continued growth of the high-voltage system except that in the residential areas in certain localities it would be more economical to handle the growth by means of zone substations.



Type of corner construction used by the Public Service Co. of Colorado to save crossarms on 12,000-volt lines

Hatch—We will retain our present 4-kv. distribution, but will not expand it. My article fully expresses our plans for handling additional loads.

Jung—As indicated in my answer to the first question, we favor the 4-kv. radial system, and higher load densities in general will be handled by expanding this system. Moreover, in portions of our system we have for some time been serving industrial loads from our primary distribution circuits and transferring the loads to 11.5- or 16-kv. circuits to provide more capacity for other loads.

LeFever—Additional distribution capacity will very probably be provided on our system by Wyeing our present 2.4-kv. primaries and going to 11 kv. on the fringes and in new areas, as indicated in my answer to the second question.

Ayres—We will continue with our present 4-kv. radial primary system, handling additional load densities with more feeders and more substations.

Wakeman—As previously stated, we are inclined to favor higher distribution voltages, but would say that we will probably continue with our present 4-kv. radial system for several years yet and handle additional load densities with more feeders and more substations.

Halpenny—We favor an increase in distribution voltage with the qualifications above stated where possible, rather than use of more copper and substations.

Koch—In connection with our urban systems we expect to stay with our present voltages and handle additional loads with more feeders and more substations as the demand arises, rather than attempt 13-kv. distribution in our residential areas. If this system could be grounded or converted to four wire at reasonable cost, there might be some argument for its general use. However, we do not believe a change to this voltage would be economical and furthermore, tree problems are particularly severe. We would, therefore, be somewhat hesitant to adopt a system of 8,000 volts to ground generally because of this tree problem and the increased public hazard when wires fail. In some of the smaller towns we serve, we plan to convert from 2.3-kv. delta to 4-kv. star as the need arises.

Minor—We contemplate no change except converting 2.4-kv. delta to 4.16-kv. Y.

Jones—Our present plans for handling additional loads are for more substations. We now have three new stations going in in Tacoma stepping down from 50 to 4 kv.

Emery—With the higher voltages we contemplate we will be able to handle greatly increased loads with a smaller copper size than previously required on our 4.1-kv. system. We anticipate we will have fewer substations resulting from the greater service areas that can be covered with 12.5 kv.

WHICH do you favor, unit, metal-clad substations, or so-called built-up substations? What are comparative costs and advantages? Do you feel that manufacturers could or might well develop some compromise design of unit substation that would combine the lower cost and more sightly features of the metal-clad station with the flexibility of the built-up type?

Jung—From the standpoint of appearance in residential areas, the unit type substation is desirable. It is also desirable because it can, as the name implies, be used as a unit and readily shifted from one location to another. However, on a large system such as ours there are usually standard designs which have been worked out and require certain types of equipment in order to retain interchangeability of elements. Furthermore, in a large continually growing system there is a sizable amount of useful equipment being continually removed. The value of this equipment would be lost, or at least much decreased, if it were not re-used at other locations on the same system. This excludes the use of unit type substations to any great extent on

our system. However, I believe that unit substations are economical for specific locations or on smaller systems because they require a minimum of engineering, and they do not duplicate other equipment. If all elements of a substation were metal enclosed in standard housings it might be possible to design these to give a better appearance to the complete structure. However, elements made by different manufacturers probably would not be interchangeable, so that initial savings would be offset by the difficulties encountered if equipment were purchased from more than one source.

Hatch—We would possibly favor the metal-clad station if there were a cost advantage. It is believed that the present design of unit substation is now sufficiently flexible, and that any attempt to make it more flexible would tend to increase the cost.

Ayres—We favor built-up substations where more than one feeder is involved or where continued growth of the area is apparent. Yes, I think that manufacturers might well develop some compromise design of unit substation that would combine the advantages of both the built-up and the unit types.

LeFever—We favor metal-clad unit type substations wherever adaptable, as they require less ground, are neater in appearance and cost less than a built-up substation. I do not believe that manufacturers could build up a compromise design of a unit type and a built-up type that would be any cheaper or more flexible than present designs, which, if properly laid out, provide for adding additional units as needed.

Bolser—The Los Angeles Department of Water & Power favors the built-up type of substation.

Wakeman—We favor unit metal-clad substations for future expansion.

Koch—So far we tend to favor the built-up substations largely from the angle of flexibility and the reduction in the amount of spare equipment necessary to provide protection in the event of failure. We believe there are advantages in the unit type designs, provided there are enough of them of the same capacity installed on the system so that spare equipment can be reduced to a minimum. I haven't given much thought to a compromise design, but hardly see how flexibility can be obtained in a built-up device such as this.

Halpenny—Up to this time we have not used any of the so-called unit type substations, but are very much interested in this development. The fact that we have been able to provide the built-up substation at a lower cost than the same class of flexibility can be provided in the unit type sub, is one reason why we have not employed the latter. However, we are very much impressed by the compactness and appearance of the modern unit type substation and, in certain locations, would be inclined toward their use for reasons of appearance. If labor continues to be as inefficient and expensive, it is our feeling that there will be a rather general move toward the unit type substation by the electric utilities. Any move on the part of the manufacturers toward development along the line suggested will be welcome.

Emery—To date, all of our substations have been on the basis of built-up design. However, there is no question but what we shall have application in the future for some unit type substations.

Jones—Up till now we have been using the built-up type of substation. The three new substations which we are now installing, however, are package type factory made stations, and from appearance's sake should be more desirable, providing we adopt one type with interchangeable spare parts. Compromise designs have already been offered, but at an appreciable increase in cost.

Minor—We have used exclusively built-up substations. We are, however, investigating the use of unit metal-clad subs for 12/4-kv. installations. We believe that further development of the unit substation is justified so that they may be more easily adapted to existing conditions, particularly where desired for additions to present built-up substations.

Purton—We favor the built-up substation in preference to the unit type because (1) the unit type is too heavy to move readily into a repair shop when repairs are necessary, and (2) in the unit substation the whole substation is put out of service if one of the component parts fails, whereas, in the built-up substation if some part fails partial service can still be maintained with the remaining equipment. This disadvantage makes it necessary to have duplicate equipment in the unit type substation. The costs of the two types are approximately equal. No, we do not feel that manufacturers need to develop some compromise design. Substations can generally be so designed that they will be as good looking as the other buildings in the neighborhood. Substations may be restricted from certain high-class residential areas.

Schoolfield—We have not used unit substations on the Pacific system. Built-up substations have the advantage of greater flexibility in re-using existing equipment and meeting increased general load demands. I think there are some possibilities along the lines of a compromise design.

Lisberger—Unit metal-clad substations have served as an ideal means of meeting load growth in certain areas and their use will be continued. It has been found in other areas that a modified unit type of substation of a capacity in the order of 8,000 kw. is more economical. Load density plays a most important part in the determination of which type is the more economical. The present type of unit substation as now developed, is highly satisfactory and but little can be done to reduce the requirements that this apparatus must meet. The major saving that can be made is that of reducing the amount of regulation required, and this is largely within the scope of the user rather than the manufacturer.

Crawford—The metal-clad type of unit substation is being given increasingly favorable consideration in order to save field construction costs. We do not have any compromise design of unit substations in mind which would have any advantage over present types.

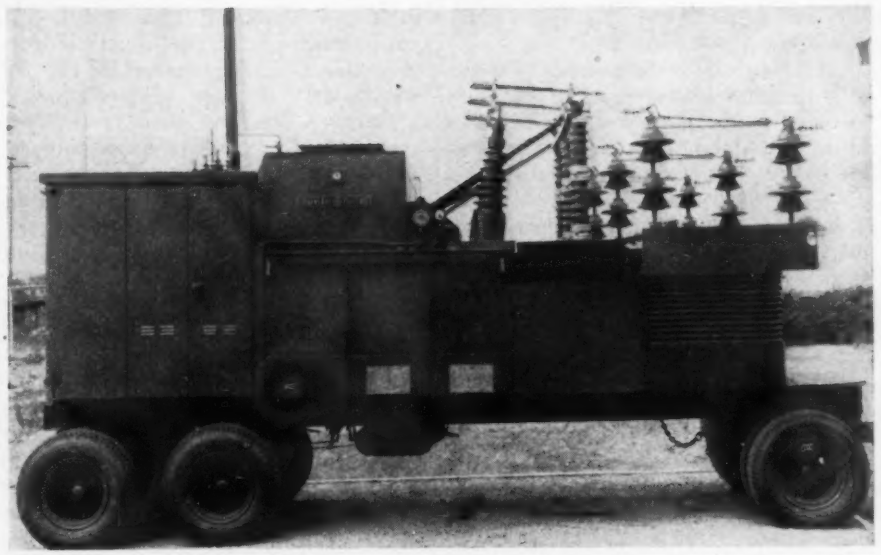
HAVE manufacturers fully met your needs in substation equipment as to type and speed of circuit interrupting devices, protective equipment, etc.? Have you any needs in the way of apparatus, fuses and protective devices, line hardware, and accessories of any and all types, that have not been fully met by products now on the market? Have you need for any modifications of present products? Specific cases are requested.

Koch—At present, the principal difficulties encountered with distribution equipment as manufactured, are in connection with fuses. Such devices rated 50 amp. and smaller are reasonably satisfactory. Those between 50 and 100 amp., we do not believe are quite so good, and those above 100 amp. seem to be rather poor. These devices should be improved. In connection with automatic reclosers, I believe there is a field for this device, provided it can be built for larger capacities. I believe some time delay feature is desirable since our experience has been that, when an attempt is made to close this device after a prolonged interruption, it will immediately trip because of the sudden inrush due to equipment such as refrigerator motors and cold lamp filaments. An air-break disconnecting switch which will interrupt charging currents at higher voltages and interrupt reasonable loads, say, up to 1,500 kva., which is reasonably priced, would be extremely desirable.

Jung—In general, equipment has been satisfactory. We have approached several manufacturers, however, with the idea that it would be advantageous to provide a fused cutout for 11.5-kv. service, so designed that a universal fuse link can be used, but upon blowing, no metal parts would be expelled.

Wakeman—We would like to see

2,500-kv. multi-voltage mobile substation owned by Puget Sound Power & Light Co. supplies emergency service



more manufacturers in a position to furnish cutouts and fuses of high interrupting capacity, as we have many instances on our 11-kv. system where the short circuit current is very high. In general, we believe that line hardware and accessories otherwise are now pretty well taken care of by products on the market.

Purton—One of our needs in distribution equipment is a primary thermal cutout which will protect distribution transformers from high-resistance short circuits without opening the circuit unnecessarily on higher value transient short circuits that would not injure the transformer windings. With the improvement of the automatic reclosing oil circuit breakers, there has developed a need for a bird-proof lightning spill-gap. Some manufacturers have gone part way by having a double spill-gap, but in areas where birds tend to gather in flocks, the double spill-gap has not proved entirely satisfactory. The gap has frequently been short circuited by two birds in series. A bird proof spill-gap should be developed.

Crawford—Minor modifications have been obtained in existing products from time to time, such as standardization of drilling holes for mountings and so forth. On the whole, equipment on the market is satisfactory.

Lisberger—Circuit breakers and protective devices for substation use are highly developed and there are available today a wide variety of fuses and protective devices. Line hardware of every description and accessories of all types are available, but some saving might be made if the variety and types of this apparatus were standardized.

LeFever—I think manufacturers should make up all switches with silver inserts in the contacts and all fuse clips should either have silver inserts or at least be silver plated. In many cases there are satisfactory developments of equipment that are rather high in price to use. For example, we pay 97 cents for a certain well-known connection for 4/0 wire, but can use in place of it a three-bolt clamp with copper shims inserted, which costs us made up only 32 cents. Under present standards, manufacturers are sending out distribution transformers with only two low-tension bushings. We have cases where it is desirable to serve both a 200- and 440-volt service off the same transformer. In which case, three bushings should be brought out and the windings of the coils properly balanced. Eastern engineers who were instrumental in changing the old standard apparently have less duplicate services than we have in the West and prefer to set two transformers for such cases on the basis that their overall transformer costs will be less. All of the distribution transformers of a certain make received of late, in sizes 50, 75 and 100 kva., have the bushings brought out in direct line with the lifting lugs. When lifting the transformer with a sling there is danger of damaging the bushings. Of course, this could be eliminated by using a spreader on the sling, but I feel that there is no reason why the bushings should not be brought out through the cover at a slight angle with the lifting lugs and thereby eliminate the nuisance.

Minor—We have not been able to obtain standard manufactured items of line hardware in all cases and have made some "designs" of our own, most of which have since been adopted as a standard by some of the manufacturers. We feel there is room for further development of fused switches for use with capacitor installation on 12-kv. circuits.

Jones—There are numerous items that could be improved. Some sort of a service buck-arm should be devised that would allow from six to ten services from one pole in heavy service areas without cluttering up climbing space, where service cable is not permissible because of service length. We *do not* use service racks, as they would clutter up worse than buck-arms. We work out our own ideas on this, but perhaps there could be something on the market for all utilities. Of course, some products are wartime substitutes which we hope will go back to their former standards. We are thinking particularly of our new primary underground cable.

Halpenny—Since the single-phasing of three-phase banks by the blowing of a fuse has always been a problem, perhaps some thought might be given to the development of a fuse installation where the blowing of one fuse would result in the tripping of the other two. The same result can, of course, be had by using a three-pole oil circuit breaker, but on installations where the cost of a circuit breaker is not justified and the use of fuses is necessary, a real need could be met by a fuse device of this character.

Ayres—Equipment is satisfactory, except for a two- or three-shot inexpensive repeating fuse device that will stand up under severe corrosive atmosphere.

Hatch—The manufacturers have not fully met the needs for an oil circuit breaker of fast interrupting speed to permit best coordination with fuses for higher voltage distribution circuits. (Note: this matter is referred to in the article by Mr. Hatch).

HAVE you done anything in the way of streamlining distribution similar to that shown in the accompanying photograph to forestall public demand for underground. Do you favor the use of secondary racks? Service cable for drops?

Purton—Considerable streamlining of our lines has been made possible by using a single pole-top pin and carrying the neutral lower on the pole, and using a common neutral for primary and secondary. We also use pole mounted transformers for both urban and rural work. This makes a very neat looking line in cities in contrast to the old lines carrying arms, heavy insulated wires, etc. Secondary racks have been standard on this system for ten years. Use of service cable has been limited due to its high cost.

Halpenny—We have made an attempt to simplify distribution design as much as possible, but commission rules place a definite limit on certain features that have to do with the problem. We decidedly favor secondary racks and have employed them for many years. The same is true of serv-

ice cable. The combination greatly improves appearance.

Wakeman—We thoroughly believe in streamlining distribution, but due to other conditions have not been able to do much along this line. We favor the use of secondary racks and service cable for drops.

Koch—I cannot say that we have made any radical changes with respect to streamlining our distribution system to forestall public demand for underground. Our linemen have been opposed to secondary racks, which I believe to some extent improve the appearance of the distribution system. Therefore, we have been more or less forced for safety reasons to the use of crossarm construction which, at best, is unsightly. With the use of the common neutral we have been able to use ridge-pins where only single-phase circuits are involved, which has permitted the elimination of some crossarms. The pole mounting of transformers also helps slightly in improving appearance. Obtaining sufficient anchorage for service cable on frame houses greatly restricts its use.

Crawford—We have made trial installations with distribution poles along the rear lot lines, with one primary wire on pole-top pin and cabled secondary on messenger, to provide better appearance in residential areas. Secondary racks are impractical in Washington, where state law requires a minimum of 13 in. from center of pole for secondaries. We have used some service cable for drops but found no particular customer enthusiasm.

Hatch—We have done considerable in the way of streamlining distribution for sake of appearance as indicated in my article on the Spokane 13-kv. system. The idea of mounting two single-phase units in one case for four-wire delta light and power service was developed by one of the manufacturers at our suggestion, which is another move on our part to streamline. Quite obviously, we favor pole mounting of transformers. The use of secondary racks is standard construction, and we use service cable drops where tree conditions are bad.

Lisberger—We favor the use of secondary racks and service cable drops and are using both forms of construction.

LeFever—We have done nothing to streamline our distribution system similar to that used by The Washington Water Power Co. for the reason that with joint pole construction it has not been possible, only in isolated cases. We favor secondary racks wherever they are adaptable, but do not favor service cable for drops, as it is more expensive than single-wires and is not nearly as adaptable for re-use as single wire.

Minor—We have attempted to improve the appearance of our lines from a public relations standpoint, but not particularly because of underground agitation. We have used racked secondaries and service racks to some extent.

Jones—We have done nothing in the way of streamlining distribution. Service racks—no. Service cable is fine and we now use it where services are 70 ft. or less. We find that it is not advisable to use over 70 ft. because of house support and weight.

Jung—We do not use vertical buses from the cutouts to transformers and, if conditions permit, we hang our transformers on line arms to gain a more sightly appearance and to save the cost of additional hanger arms. We favor the use of secondary racks, but have been deterred in their use because of the additional pole space required, which does not allow as great a saving as would otherwise be possible. We use service cable to a limited extent but generally its cost is greater than conventional service wires.

Schoolfield—We aim at simplification, but have done nothing specific in the way of streamlining. Service racks are used where practicable. Stringent clearance requirements in Washington limit their economic use under some conditions. We have avoided the use of service cable on account of cost and the possibility of demand for changing existing services to conform.

Purton—We have just completed a new set of line specifications which will streamline our distribution system. We favor the use of secondary racks and service cable for drops.

Bolser—We have done nothing as yet in the way of streamlining.

Ayres—No attempt has been made at streamlining as yet. Secondary racks are favored in rural areas where it is possible to use them. Service cable is favored where expense of installation is comparable to the usual service drops.

WHAT about synthetic wire coverings after the war? Do you think they might have advantages in cost, durability, etc., over standard weatherproof wire?

Crawford—We are hoping that an outdoor conductor with synthetic or plastic type of covering will be developed for primary voltages which will retain its insulating value, and offer protection to linemen as well as from tree interference.

Koch—In connection with synthetic wire coverings, it would appear that there might be quite a field for this type of material. If synthetic coverings can be developed that are competitive with weatherproof and provide real insulation value over a long period of time, there would definitely be an advantage to public utilities.

Bolser—A synthetic wire covering that would eliminate the fraying and festooning of weatherproof insulations would certainly be desirable if costs are reasonable.

Ayres—Possibly synthetic wire coverings will have advantages. We expect to experiment with 5-kv., 12/64-in. Flamenol as a substitute for short lengths of 12/64-in. Coronal tape and braid as a starter.

Schoolfield—We use weatherproof wire generally only for service drops and have not considered synthetic coverings.

Jung—Generally, I prefer bare wire to weatherproof because I believe that, in the long run, bare wire is cheaper. Weatherproof wire or insulated wire, of course, is required for customers service drops or street light drops, and for this service synthetic coverings should offer advantages.

Jones—We think lots of things developed for armed force use will be used by industries and possibly will be better than those we now have.

Halpenny—The idea of substituting some synthetic wire covering for what has been used as standard weatherproof covering in the past is certainly intriguing. The operating man has very little to say for standard weatherproof insulation, especially after it has been in service for a few years. The advances that have been made in the use of synthetic materials may bring about some substitute that will have superior lasting qualities and compare in cost with the usual type of weatherproof covering.

Emery—We have not considered synthetic wire coverings as against the present weatherproof wire. Except for services we have almost entirely dispensed with weatherproof wire.

Hatch—Our use of covered wire is limited to service drops, and to date, we have had no experience with synthetic coverings.

Wakeman—We doubt that synthetic wire coverings will have advantages in cost, durability, etc., over present standard weatherproof.

Minor—I think a synthetic wire covering can be developed that will be superior to weatherproofing from a durability standpoint and insulating effectiveness. I do not imagine costs could be less than weatherproofing.

LeFever—I believe that synthetic wire covering will be brought out after the war which will be lighter, cheaper and probably more durable than our standard weatherproof.

Lisberger—It is doubtful at this time if any of the new synthetic wire coverings can be economically used as compared to weatherproofed wire. Undoubtedly the synthetics have some advantages, but under present-day

costs they could not be justified and it does not appear that the cost will be reduced to that of weatherproof.

HAVE you developed anything in the way of rural construction to reduce construction costs, more effectively to compete with REA cheap construction?

Jones—Nothing except the use of bare hard-drawn copper wire and ACSR aluminum, which allows the use of longer spans.

Lisberger—We have given very careful study to building distribution lines in low-revenue areas and have carefully examined some REA projects. We are of the opinion that there is a mistaken idea about the REA (at least in this territory) being cheap construction. Such installations as we have observed have been built economically. By using span lengths suitable for the territory involved, selecting the conductor that is economical and suitable for the service and by carefully designing the line, we believe that anyone can build at practically identical costs for material and labor. Distribution lines consist of a mass of small items. It is the economical use and placing of these items that determines costs.

Halpenny—So far, the use of high-strength conductor and longer spans have been our principal aids in reducing rural construction costs. In some of our territory, we have employed span lengths that, 20 years ago, would have been considered impossible. Our records of several years' operation have not caused us to regret the type of construction used.

Emery—Our lines in general are constructed similar to those built by REA. They are, however, first-grade lines in every respect. In many instances our construction was competitive to REA from the beginning.

Koch—For rural construction, we have generally adopted about the same type of construction as used by REA. However, we believe that their design, although it may comply with NESC, is too flimsy, and that in the long run it will cost them considerably more in maintenance than if a more conservative design was employed. A number of wet snow storms in Colorado have certainly indicated to us that their lines are too weak.

Wakeman—We have employed long-span construction but have not been able to adopt other features of the REA construction due to the nature of our circuits.

Hatch—We have been building low-cost rural lines for many years.

Schoolfield—We have built fairly low-cost rural lines for years. In the past few years we have accented long spans with high-strength conductors. Costs compare very closely with so-called "cheap line" construction under similar conditions of territory, loads served, labor agreements, actual costs included, etc.

Minor—An analysis of several REA projects reveals that, for like construction and bookkeeping methods, our costs are comparable to REA.

Crawford—We have developed a rural type of line construction which is just as cheap as REA, using pole-top pin, common neutral, steel-wire and very long spans, but can use it economically only at locations of very light load density.

LeFever—In our rural construction we have installed considerable No. 6 steel wire with a maximum span of 700 ft. and also, where there is heavier loading, a considerable amount of No. 8-A copper-clad wire with 450-ft. spans. This type of construction is very economical and I believe will compete with any of the REA lines.

Jung—We have, over a period of years and as materials have improved, been able to reduce the costs of our rural construction. Studies indicate that further cost reductions are possible. We will not be able to reduce our costs to a point comparable with REA because we cannot employ the less expensive construction practices of REA.

Purton—We have developed long-span rural construction with the use of high-strength conductors to reduce costs.

DO you think that service standards could be lowered to reduce construction costs: (a) urban distribution; (b) rural lines?

LeFever—As our service record in urban distributions is close to 100% I believe our service standards could be reduced slightly and effect considerable reduction in construction costs. This would not be accomplished by lowering our construction standards to any extent, but by cutting down on standby equipment and eliminating a thousand and one gadgets that we now think necessary, which I sometimes feel cause more trouble than they eliminate.

Crawford—We believe that increasing uses and dependence on electric service prohibits the lowering of service standards.

Lisberger—I think that, in some instances in the past, service standards have been too high and costs have been increased thereby. In both urban and rural areas, I think more duplication of feeds, i.e., alternate sources of supply to the customer, have been provided than have proven necessary. The service record, as far as continuity of service is concerned, during the war period when such duplication has not been allowed has been good. I am also of the opinion that in prewar times substation equipment, particularly transformers, were over installed. Too much spare capacity such as standby transformers were installed. Equipment was not loaded to capacity from a thermal standpoint. Again, war experience has indicated that loading substation transformers up by the use of forced oil cooling, water sprays, fans or what not, to from 20 to 30% above their name-plate rating is good practice and materially reduces costs. While continuity of service may be jeopardized by such methods, very little difficulty has resulted.

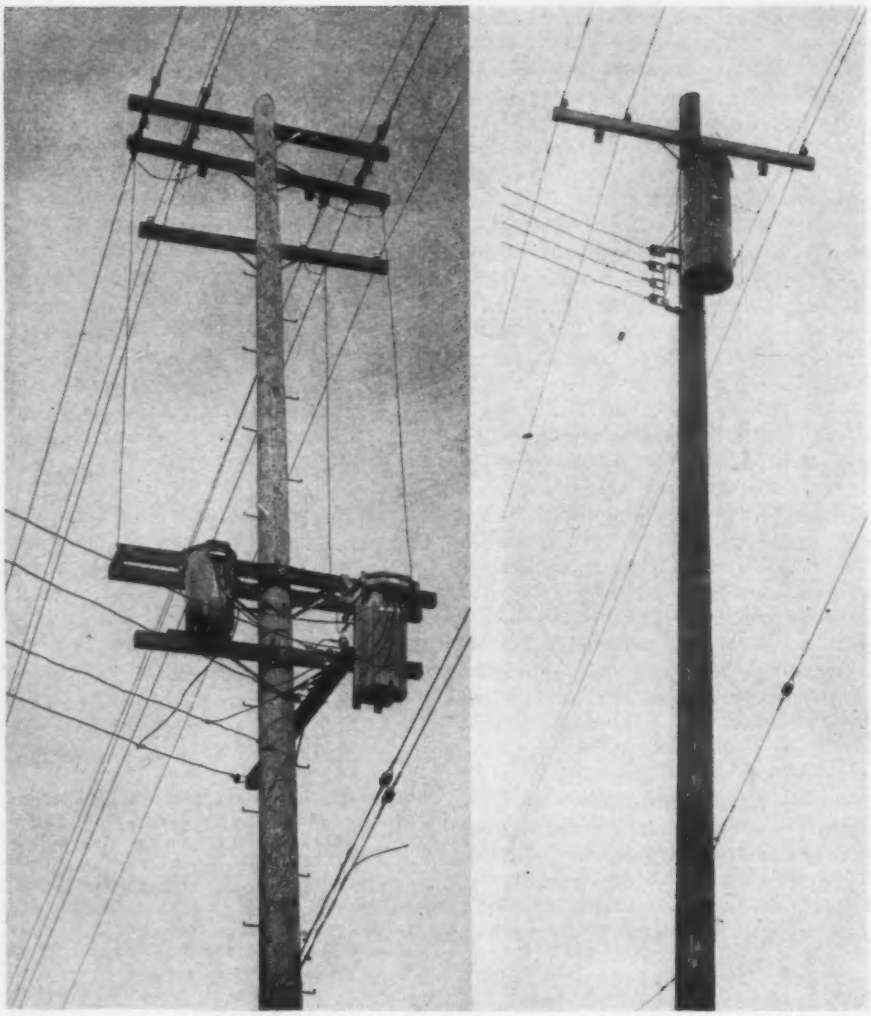
Other replies indicated almost without exception the feeling that service standards cannot or should not be lowered. Several called attention to the fact that many rural loads, including poultry incubators, refrigeration, irrigation pumping, electric ranges and water heaters and other farm usages cannot accept outages of appreciable duration. Over a period of time the public has been constantly demanding better and better service and it would be a step backwards to consider lowering of standards at this time, was the essence of several replies.

WOULD you use two-unit distribution transformers as shown by the photograph if they cost the same or only slightly more than the equivalent of the two single-phase units separately tanked? The photograph submitted is here reproduced and shows a single long case containing two single-phase core and coil units of dissimilar size for four-wire delta light and power service from open delta or open Y primaries. Do you favor pole mounting on a single through bolt as shown?

Crawford—There is some question about the over-all economy of introducing still another device. One of the hidden costs in distribution is the ever increasing number of devices and articles which the stores department has to stock. In some cases, it will be found cheaper to use a standardized device even though it may be larger than required, due to the high cost of labor compared with the cost of materials and stores costs. In built-up areas where secondary mains are provided for lighting service, our practice is to install only one additional transformer connected in open star or open delta with the lighting mains, to provide three-phase four-wire delta light and power service. This scheme uses standard single-phase transformers which we stock in large quantities anyway. Direct pole mounting of transformers is our standard practice.

LeFever—We have had no experience with the two-unit transformer, but where light construction prevails they may be used more extensively. We favor mounting transformers with a single through-bolt wherever adaptable.

Purton—We would consider the limited use of two-unit transformers,



Open delta transformer bank is replaced with two-unit transformer (right). Do engineers favor such a transformer?

if the costs are comparable with two single-phase units separately tanked. We favor pole mounting of transformer with *two* through-bolts.

Ayres—Possibly. Single through-bolt mounting is favored.

Koch—Some years ago it was our policy to purchase three-phase transformers up to 50 kva., but we discontinued this policy largely because of the lack of flexibility. It would seem that a two-unit device would lack the desired flexibility for overhead transformers. It occurs to me that two through-bolts should always be employed in pole mounting of transformers.

Wakeman—We do not favor the use of two-unit distribution transformers in a single case, or three-phase transformers where the units are mounted vertically in the case, on account of the length of the cases in such instances, due to extensive joint pole use. We favor single through-bolt mounting of transformers for rural distribution.

Emery—Possibly the two-unit transformer has some application. Our needs, however, seem to be well filled by using two transformers on the smaller loads in open delta or open star. We definitely favor pole mounting of transformers and this is our standard. However, we use two mounting bolts.

Halpenny—We are not completely sold on the idea of two-unit distribution transformers. Pole mounting of transformers with a single through-bolt is quite advantageous in some construction, although, at the present time the question of protecting the through bolt in a manner satisfactory to the California Commission is somewhat of a deterrent. We do not like any of the protective schemes offered to date.

Lisberger—We favor the pole mounting of transformers and are using this construction for single-phase installations.

Hatch—We naturally favor the two-unit transformer as the photograph is of an installation on our system. Single through-bolt and lag screw is satisfactory for the pole mounting of smaller transformers not larger than 15 kva.

Minor—We have made small use of open delta transformer installations and are not contemplating increasing that practice. I am in favor of through-bolt mounting of transformers, but cannot see the necessity of the requirement that the supporting bolt be covered or insulated on the face of the pole away from the transformer.

Schoolfield—From a strictly appearance standpoint, the two-unit transformer has merit, but flexibility is not as good as for single units and stocking for unknown loads would be a problem. We are in transition to pole mounting of transformers, but details have not yet fully been completed.

Jung—I would not favor the use of a two-unit distribution transformer because of the lack of flexibility and due to the stocking problem. In some locations I would favor pole mounting, although, in my opinion, no satisfactory method has been devised for covering the end of the mounting through-bolt on the climbing side of the pole. As far as I know this is required only in California.

THE question was asked whether there was any worry over possible increased telephone interference in joint construction resulting from bad wave form of present auxiliaries when fluorescent lighting invades the home after the war.

The subject seemed to be so new to most engineers that they had no opinion to express. Several who did comment feel that it is a problem up to the manufacturers to develop proper ballasts and that the utilities should not have imposed upon them an impossible policing problem.

ANOTHER question concerned expected residential load increase in the first five years following the war. Following is the substance of replies by companies:

Tacoma—Zero increase the first year after the war ends, and 5 to 10% increase per year thereafter.

Washington Water Power Co.—Approximately 25%.

California Electric Power Co.—Not *planning* on a 100% increase, but are giving thought to the consequences of such an increase in the years following the war.

Idaho Power Co.—Planning for a 5% per year increase during the five years following the war.

Los Angeles Dept. of Water & Power—Preliminary estimates assume a 25% increase during the first five postwar years.

Northwestern Electric Co.—Total system increase is estimated at 10.2%, but residential increase will be somewhat higher than this figure.

Puget Sound Power & Light Co.—Not figuring on any definite percentage increase, but are prepared to serve greatly increased loads.

Is it Time to Revive League Activity?

Westerners attend league conference to bring back ideas for their own programs; Hartley report filled with significant information

IS IT TIME for electrical leagues to come out of hibernation? What can they do to prepare for better days ahead? What are some of them doing by way of preparation? Can or should a program be organized now? Should manpower be sought to carry forward such a program? These questions affect all in the electrical industry because from the promotional activities of such leagues and bureaus come business for all branches of the industry. Boards of directors and committee men already have asked themselves these questions.

As the time nears for a resumption of business stimulating activity and promotion the electrical leagues of the West have prepared themselves for such tasks by participation in the annual conference of the International Association of Electrical Leagues, at Detroit, Sept. 20-22. Attending from the West were Victor W. Hartley, managing director, Pacific Coast Electrical Assn., who was elected a vice-president; J. Clark Chamberlain, manager, Bureau of Radio & Electrical Appliances of San Diego County, re-elected a member of the board of governors; George E. Lewis, manager, Electrical League of Colorado, and Kimball Vance, president of the Electrical League of Utah.

Some of the highlights from Hartley's report to his directors, a comprehensive report covering every paper and discussion presented at the meeting, will reveal the thinking and preparatory work that electrical leagues can be and are doing. Hartley himself presented an outline of the means to organize and conduct a home planning institute, something which has been eminently successful in California.

That all the war publicity to electrical devices of war and the enforced starvation for electrical appliances and lighting will create a pent up demand that may turn into a business spree for a couple of years, was the comment of W. E. Ritt of Minneapolis, chairman of the association. He warned that a headache might follow, however, if plans did not anticipate a let down and something is not done to deglamorize some of the fantastic thinking prevalent today.

The old "Red Seal" for wiring certification is dead, J. S. Bartlett, manager of the Washington, D. C. league, told the conference, for reasons of dissolution of the old Society for Electrical Development and its copyright. But the A-W symbol and certification plan is still the soundest method to promote wiring and will be continued by the National Adequate Wiring Bureau. Other ways to promote wiring include close local tie-ins with the Electrical Living program, getting all electrical advertisers to mention wiring, a program to builders urging certification to prevent their homes from becoming obsolete because of the "dream home," close contact with home financing agencies, and a national program pointed at farm electrification.

Because home building costs have risen so sharply in the past few years and the house that used to cost $2,500 now costs $6,000, W. J. Guinan, representing a builders association, said it might be necessary to extend time payments over 40 years and to include all home appliances in the mortgage. The impracticability of such long terms was argued and the need to educate the public rather than expect government guaranteed handouts for financing of homebuilding was made plain.

To air condition—both heating and cooling, and air cleaning as well—all homes and stores and offices possible is the aim of the newly created Indoor Climate Institute, said T. A. Crawford of Timken, a vice-president of ICI. Promotion of air conditioning will be directed through local leagues and made to fit the individual climate and fuel conditions of the region, backed by national advertising and promotion. It will increase the market for electric and electronic controls, electrostatic air cleaners, and expand the need for adequate wiring.

First making the point that national statistics as to market potentials for any appliance are to be used only as a check against a careful analysis of the immediately local market, W. F. Switzer, research manager of Frigidaire, outlined the method for checking local population trends, income payments, bank debits, and sales trends in prewar years to arrive at sensible potentials for the normal year of full production after the war. Then he listed some 53 local conditions to think about and take into account in judging and adjusting these results up or down. He was emphatic that America is made up of hundreds of individual markets, each of which should be appraised individually to set up postwar goals or expectancies.

The purposes and program of the National Electrical Retailers Assn. was told by M. E. Rodger, Middle West Service Co., Chicago. All groups in the industry except dealers have national organizations, he said. How existing local organizations or divisions of leagues might affiliate nationally is being studied. The industry's increased dependence upon the dealer and likewise the dealer's importance as the service agency on appliances was brought out.

Leagues can and should act as clearinghouses, A. H. Kessler of Minneapolis told the conference, to bring to NEMA customers' ideas as to the devices and appliances they need from the field, particularly in the field of farm electrification.

Discussing the future of lighting, J. L. Kilpatrick, Westinghouse, illustrated the trends and opportunities so completely covered throughout the West last year by Sam Hibben. In subsequent discussion it was brought out that 28 or 30 states now require power factor correction, that the IES has discontinued its active participation in the certification of floor lamps; and that an international lighting exposition is to be held in Chicago, April 19-23, 1945, under NEMA auspices.

Speaking of *The Dealer's Place in the Complete House Program*, Richard M. Jones, of *Architectural Forum* said that the way to reach the vast market of people who can afford only from $20 to $50 a month for home payments, was to include the equipment in the home and finance it along with the mortgage without greatly increasing monthly payments. Difficulties with that idea, discussion brought forth, are disruption of normal trade channels by purchase direct of appliances by large builders, service problems on equipment sold without benefit of dealer, financing problem when equipment wore out or became obsolete before the house did, and the question of who holds first lien on the replacement equipment.

Rolling several national movements into one big package, M. E. Skinner, Buffalo, Niagara & Eastern Corp., advocates joining the Better Light-Better Sight, Modern Kitchen, Adequate Wiring, Modern Home Laundry and In-

door Climate into a composite Electrical Living Program. National advertising and promotion along that line is being prepared. Field promotion, though, for this Five-Star Home, will be channeled through local leagues to tailor it to fit local conditions.

W. T. Stuart, editor, *Electrical Contracting*, told the facts and figures in both man-hours and materials which can be sold in the modernization of commercial and industrial establishments. Held down during the war, obsoleted by recent developments, the electrical, the lighting, the air conditioning facilities of commercial buildings will be ripe for overhauling and modernization. He gave as a rule of thumb figure that commercial construction usually runs about a fifth of the residential construction in any given area.

B. J. Martin, editor of *Electrified Industry*, added emphasis by establishing that practically all plants are obsoleted now by the new processes developed out of war necessity and to meet new competitions will need to improve products and modernize processes. He described several brand new processes as examples; electrostatic tear drop removal after dip painting, electrostatic low-pressure paint spray guns; electrothermic heating of plastics from the inside out before molding, dip-brazing of aluminum in an electric salt bath, cold treatment of metals to organize molecular structure and stabilize its shape and size in making gauges and tools, high-intensity lighting (150 f-c) in a welding plant to save the eyes of workers. Discussion of Martin's paper brought forth the need to convey technical information to maintenance engineers sans "$10 words."

With the same dramatic display board used in addressing audiences in the West recently, Don P. Caverly, Sylvania Electric Products Co. closed the conference with his talk on electronics.

The managers meeting, following general sessions, passed a resolution urging NEMA, NEWA and EEI to support a united industry promotion of adequate wiring. The trend among many utilities to declare themselves out of merchandising after the war was also discussed. A broad program of advertising by the Philadelphia league to prepare the public for rewiring was also the object of interest among league managers.

No Immediate Reconversion

As he customarily does when attending a league conference, J. Clark Chamberlain, San Diego's energetic bureau manager, visited some 16 manufacturers and talked with trade magazine editors to obtain for his dealers the latest information regarding manufacturing plans. He was disappointed at the results. In a letter to ELECTRICAL WEST, of which he is on the editorial advisory board, he writes:

"My visits were being made just at the time when the rosy outlook of early and mid-September was being replaced with the realistic thinking we should have had all along, but for the propaganda releases which led us to believe, first that the war in Europe would be over in a few days or weeks at most, and second, that appliance reconversion was to take place in many instances at an early date.

"I left the midwest with the conviction that we had all been given a first-class ride by the OWI and the WPB, and I'm sure the manufacturers I talked with felt the same way. Instead of a gradual reconversion that had been promised in the Aug. 14 WPB releases and in subsequent representations, things were working out in such a way that virtually nothing can be done to make a move toward reconversion, and little is to be expected now until after Germany is defeated. All of these high-sounding promises really mean nothing, I discovered, for there was always some loophole WPB regional or national officials could use to stall action.

"For public propaganda they continue to talk about what is going to be done, but I predict virtually nothing will be done about reconversion until Germany falls, which now looks to be a matter of months ahead instead of weeks. Furthermore I predict that when the public comes to realize that all these WPB statements were largely empty words, the WPB will find some way to charge the manufacturers with the responsibility for not having made preparations for production.

"Don't think my visits, however, were not tremendously interesting and of value. Definitely they were, and I came away from many places with renewed enthusiasm for the future, but with the sad realization that, instead of seeing some appliances begin to roll off the lines in December, we'll be lucky to see anything happen now, outside of the iron program of course, before early spring."

● SPRING MARKET WEEK at the Western Merchandise Mart, San Francisco, will be from Feb. 5-10, Frank K. Runyan, president of the Mart, announced. The Mart has begun to experience reconversion. As war agencies which crowded the building have relinquished space, electric and gas appliances, radio, washing machine and housewares representatives have taken space for offices at least in anticipation of the day when they can again display merchandise for retail store buyers. If relaxation of restrictions on materials permits manufacture of samples of proposed appliances, the Spring Market may be especially valuable to dealers. Transportation and hotel accommodations in San Francisco are not likely to improve, indeed may grow worse, as the Pacific war is pushed strongly, so buyers are cautioned by Runyan to make their reservations secure.

Utah Training

Approximately 113 of the 151 enrolled in the refrigeration classes sponsored in Utah by the National Refrigeration Manpower Committee and the Electrical League of Utah either completed the course or accepted positions as refrigeration service men before the classes were finished, according to J. F. McAllister, coordinator.

Results of the training program in the five schools were entirely satisfactory, according to McAllister, and an inquiry indicates that very few domestic refrigerators in the area have been out of service for any appreciable time.

Vocational training schools are in favor of continuing the classes this fall and most of the students have requested a continuation in order that more experience may be gained in diagnosing and correcting service troubles, McAllister said. If there is sufficient interest on the part of the industry in having such classes continued in the school, funds for their maintenance can be obtained. he has been informed. Some students also have requested an advanced course.

● REVEALED as a result of hundreds of "off record" conferences with the Los Angeles Chamber of Commerce domestic trade department, are a number of interesting new products contemplated by manufacturers in that region. The list includes kitchens equipped with more mechanical mixers and automatic controls. Another significant product proposed is a portable power plant. This is an adaptation of the small power plants designed for far away Pacific islands which can be converted to use in a civilian industry or made portable for traveling repairmen or for campers.

● VACUUM CLEANER production for civilian use will be delayed for some time yet, according to a recent statement of R. J. Simmons, of Chicago, president of the Vacuum Cleaner Manufacturers Assn. The bottleneck will be small motors and the fact that most of the manufacturers are now engaged in war production to furnish such motors for airplanes and other war tools.

Dealers—

Roll Your Own Planning

or what to do till the business comes back after the war

ANYBODY can get in on this planning business. It's not exclusive. Nor is it only for the big outfits.

It's just *smart* to do some planning of your own. Needn't be elaborate or cost a lot.

But it will put you in stride to pick up business when appliances and electrical equipment come back.

For instance, here are some things you can *think about* and do right now—

Answer these questions for yourself.

Your location

How good has it been for your present business?

Is it as good as you'd like for postwar business?

Could you improve business by—

—enlarging your store or premises?
—maybe moving to a better location,
—say to follow a shift in retail trade area,
—or to get more pedestrian traffic,
—or maybe more drive-in auto traffic,
—or to follow changes in local transportation?

Suppose you changed your type of business or the lines or kind of merchandise you handle?

On the other hand, would it take on a *new* feeling if you fixed up the old place, modernized it, new paint, new decorations, inside and outside?

Parking space—when gas comes back—can that be arranged for now in order to have it clinched?

Your store front

Have you stood across the street and taken a critical look at it lately, asking yourself—

—Are the windows the way they ought to be—such as large enough, or high enough, or wide enough, or attractive enough, or well enough lighted?
—Is the entrance inviting? Is it easy to walk into your store? Would you feel like it if it wasn't your store?
—How's the paint; is it old, scaling, soiled, or the wrong color?
—Is the entire front modern? Not necessarily freakish, but at least should it be streamlined a bit, perhaps?
—How's the old sign? Are there too many signs, so that the eye doesn't stay on any one of them? Would a clean new sign be a good hunch?
—Need any light on the front at night? Need floodlighting or outline lighting or silhouette lighting to make it stand out along the street?

Your store inside

Of course, you are used to it now and it looks all right, but just imagine yourself a new customer seeing it for the first time—

—Is the paint job o.k? Would a freshening-up be in order? Does it look clean and up-to-date?
—How is the lighting? Thought about brightening it up? Giving it a new look with new fixtures or lighting it differently somehow?

Now about that display space—

—Do you want to departmentalize? Put related appliances in certain places or centers?
—Have you just the right sort of tables or counters or display pieces for table appliances?
—Want your major appliances any particular place? Want to group them? Make a kitchen center, a laundry center, a table appliance section?
—Radios will be back, so where will be best to display them? Need listening rooms? If you have a record business how prominent do you suppose you should make it when radio comes back?
—New stuff—deep freezers, air conditioners, other new promised appliances, where will be best to display them?
—If you've taken on other lines for the duration, what do you intend to do with them afterwards? Where will they be displayed in relation to the appliances?

Your Office

While you are in the mood, why not give the office a look over to see if it can be improved? Does it need new paint? New office equipment? A different location?

Your Warehouse and Shop

If and when—would you want more or less space? Is it the time to line it up right now?

Have you thought out whether you want to do more or less of your own service work? Need any new facilities? Would a re-arrangement be better?

All of these questions, naturally, are for your own analysis. Even thinking about them will make you better prepared. Doing something about them will give you a head start.

Prepared by Pacific Coast Electrical Association Planning Committee

Electrical West—Vol. 93, No. 5

San Diego's Sales Plans Told Dealers

Anticipating big drop in war load, company organizes to restore business through domestic and commercial promotion for industry

ANTICIPATING a drop of perhaps 70% in its war industry load, some military camp load, even a loss of some residential load to war workers, the San Diego Gas & Electric Co. postwar program will be directed along lines wherein there is opportunity to recover some of the losses. This was made plain to the electrical industry of San Diego by A. E. Holloway, vice-president in charge of sales for that company at the spring conference of the Bureau of Radio and Electrical Appliances.

Agricultural load is expected to stay put and commercial business to dip slightly. The field for development, Holloway said, will be in the home. There are 107,000 connections to homes in the company territory, 95,000 of which have gas connections also. This does not include government housing which may be removed after the war. Of the 12,000 rural homes served only about 6,500 use electricity to cook, 5,000 have electric water heating. Taking into account replacements, Holloway estimated a market for 10,000 electric ranges and 10,000 water heaters, exclusive of city sales in gas territory. Some 5,000 new rural homes should be built after the war, he felt.

In announcing the company's merchandising policy, Holloway declared:

"I have been asked by several dealers and jobbers what our company's position will be in reference to merchandising during this period (after the war, the two or three years before the supply of standard, well made appliances catches up with the demand). Our company has never been interested in merchandising appliances for any profit direct from the merchandise business. We have been interested only from a load-building angle and in attempting to act as a stabilizer to the appliance business.

"We have been in and out of the appliance business twice since 1910. We entered the business the last time to stabilize it. The appliance business had gone to pot on account of price cutting, lack of dealer cooperation, and lack of promotional and advertising effort. This resulted in a particularly poor quality of appliances being marketed, due to price competition.

"I believe we succeeded in bringing about a much better relation between dealers, better equipment and less price cutting. I know we succeeded in building up the promotional and advertising effort put forth by the industry.

"As you know, we discontinued merchandising in 1942 as soon as the manufacturing of appliances was stopped. As it is our opinion that it will be three or four years before the supply of merchandise will exceed the demand, we can see no need for our company to enter the merchandising field again, at least within that period.

"However, there may be some new gadget or certain territories which it will not pay the dealer to develop and in such case our company may see fit to merchandise again a particular piece of equipment or in a particular territory.

"Our company's load-building organization is now being planned, in order to be in position to start our activities as soon as manpower is available. Certain men in our organization have been given the responsibility of developing certain phases of this load.

"As long as your bureau continues to cooperate in the development of the gas and appliance business in San Diego in a high-type manner and as long as you continue the promotional and advertising effort that you have displayed in the past few years, it is my opinion that our company will not see fit to re-enter the appliance business."

The commercial department of the utility has been built upon a concept that its staff will assist the mass effort rather than in individual sales effort. There will be sections responsible for power sales, domestic sales, commercial lighting, street and highway lighting, the load of government and military establishments and rural development and line extensions.

Commercial lighting, it may develop, will be fostered by an engineering bureau within the Bureau of Radio and Electrical Appliances. More of the general and specific promotional activities for the industry may be channeled through the bureau rather than undertaken directly by the utility. Home laundry center promotion, electric kitchen promotion, adequate wiring promotion as well as commercial lighting, might be so handled. The bureau may also work for term financing arrangements, service shop facilities, and unsafe appliance control on behalf of the entire industry. Such were Holloway's recommendations to its members.

Another of the series of sketches of tentative postwar plans of the sales and commercial departments and managers of Western utilities. These previews, of course, are subject to change because the war is not over and many new conditions may enter to alter or adjust programs. However, such sketches do give the industry an indication of the thinking and the plans as they appear at the present time.

War souvenirs sent by 195 of San Diego Gas & Electric's employees on military leave stationed in all parts of the world made a window display that drew unusual crowds. An illuminated map indicated where employees were serving; ribbons the different parts of the world from which the war souvenirs came

Extended

NWEL & P dealer meetings held in Oregon cities

SOME 600 electrical appliance dealers, contractors, manufacturers' and jobbers' representatives and utility people attended two regional meetings of the Northwest Electric Light & Power Assn. at Albany, Ore., September 29 and Portland, October 2. These meetings, which were devoted to the postwar plans for appliance promotion by manufacturers, jobbers and utilities, were similar to the series of ten meetings held in Washington, Idaho and Oregon in June. The Oregon meetings attracted attendance from the southwestern counties in Washington and Willamette Valley counties in Oregon, covering generally the territories served by the Portland General Electric Co., Northwestern Electric Co. and Mountain States Power Co. In Albany 123 attended; in Portland, 475.

The program of both meetings was the same as to subjects and speakers except that Z. E. Merrill, president, Mountain States Power Co., spoke for that company in Albany, while James H. Polhemus, president, Portland General Electric Co., and T. E. Roach, vice-president and general manager, Northwestern Electric Co., represented their respective companies in Portland. All three utility speakers emphasized that appliance selling in their respective territories after the war would be carried on by independent dealers. They would not merchandise but would advertise and promote the services performed by appliances and would maintain home service departments for home and store demonstration, making these departments available to all dealers.

S. S. Brundage, General Electric Supply Corp., Portland, represented the manufacturers and distributors, stating that the first appliances to appear on the market after the war would be the 1942 models. Among the new developments would be garbage disposal units, the automatic laundry, home freezing units and the improvement in house heating and air conditioning now being organized through the Indoor Climate Institute.

The National Adequate Wiring approach to the wiring of postwar homes was told by Howard Colburn, Graybar Electric Co., Portland, emphasizing that adequate wiring is the key to comfortable living in the postwar era. Home buyers will find it impossible to secure immediately after the war all the electrical appliances they will eventually come to use and the smart building contractor will see that the house he offers for sale has plenty of capacity, circuits and convenience outlets to take care of the needs of the homebuyer for the future.

A lighting show demonstration was conducted in two sections by Walter E. Potter, Lamp Department, G-E Co., Portland, and H. L. Bargion, Lamp Division, Westinghouse E & M. Co., Portland. Potter covered new light sources and the trends of lighting emphasizing the prospective developments in the ultraviolet and infrared fields. Bargion showed slides illustrating applications of the germ killing ultraviolet lamp and of the new circular fluorescent lamp. He also demonstrated the precipitron, a Westinghouse design of an electrostatic air filter.

Berkeley Snow, executive secretary of the association, who acted as chairman of the meetings, spoke on the association as a coordinating agency for the purpose of unifying electrical industry promotion in the Northwest territory.

When the Shooting is Over was the subject of the closing inspirational talk by Dr. G. W. Allison, Puget Sound Power & Light Co., Seattle. He pointed to the need of cooperation in the industry as a means of making the most of the industry's opportunity in the highly competitive situation that will exist when the green light is given for the manufacture of civilian goods. Recalling the success of national promotion of electric refrigeration, electric kitchen, Better Light-Better Sight, and similar industry promotions in prewar days, he stated that activities similar to these in the postwar era would increase the business of everyone in the industry, provided everyone would plan for effective tie-in.

● To Cover All Models equipped with the so-called "Scotch-Yoke" sealed refrigerator mechanism, General Electric Co.'s appliance product service section has just issued a comprehensive household refrigerator service manual. This would cover all machines manufactured since 1934, over 3,000,000 of them, including many of the later style Monitor tops. The manual is profusely illustrated with pictures and drawings to give full descriptions of all parts and service details. Cabinets, likewise, are illustrated and repairs to them outlined. The manual is 8½x11 in., with a heavy cover and is distributed through General Electric Co. distributors at 75 cents per copy.

● "Laundry Queen" will be dropped and the washing machines of the Automatic Washer Co., Newton, Iowa, will return to the original product name of "Automatic Washer" after the war, according to W. Neal Gallagher, president and general manager of the company. With a registered trademark to this effect, the company evidently means to capitalize upon this name for its postwar model.

Northern HPI

With thirteen Home Planning Institutes already started and active prospects for nine more, all of them exceptionally well attended, the fall season opened in northern California. Sponsored by eighteen associations and interested companies as a general program and with local sponsorship in each instance, the institutes are being put on by the Adult Education Department of the schools in each community. Direction of the institutes is handled by the schools but the electrical industry groups have been called upon for considerable of the planning and handling. J. R. Lazarus, Pacific Coast Electrical Assn., heads the important speakers committee which provides the educational program for each of the institutes from among the sponsoring organizations.

Institutes are already under way at the Oakland Technical High School, Berkeley Garfield Junior High, San Leandro High, Lafayette Junior High School, Santa Rosa Junior College, Salinas High School, Watsonville High School, one of the high schools in Stockton, Modesto Junior College, Marin Junior College near San Rafael, Hollister High School, and the Pittsburg High School has an institute to start Nov. 8. Taft Union High School has one under way. Work is being perfected to start one at Palo Alto, Sacramento, Pacific Grove, San Jose, Fresno and four in San Francisco, Merced, San Luis Obispo, Santa Maria, Bakersfield and Chico. Attendance at Oakland Tech has been about 500, at Berkeley 475 and attendance at others has been remarkably large.

On the speakers' list representing electrical subjects, which out of the total of 20 hours occupies four hours of the course, are as follows: On adequate wiring, J. A. Hill, Pacific Gas and Electric Co.; Graham Holabird, National Electrical Products Co.; Dave Nurse, Okonite Co. On the electric kitchen, Mrs Elizabeth Madigan, home economist from General Electric Co., Bridgeport, and Miss Lois Ferris, Westinghouse home economist, San Francisco. Lighting, Clark Baker, Northern California Electrical Bureau; Walter Carlson, General Electric Lamp Department; Victor Fink, Westinghouse Lamp Division; Jack E. Hammond, Pacific Gas and Electric, Fresno, and Gilbert Trosper, PG and E, San Francisco.

Population Trend

PG and E issues first postwar market study

FIRST of a series of studies, *Factors Affecting Your Postwar Market*, which the Pacific Gas and Electric Co. is making and turning over in book form to the industry in its territory, was brought forth and distributed early this month. The first book concerns population trends and is Study No. 1 of a series which the planning committee of the utility is making. This book, together with others which will follow on other subjects, is being sent to appliance dealers and contractors throughout the system. Each book is especially tailored to pertain to the specific division in which that dealer is located, in other words his own market.

A few master books containing data for the entire system are being prepared for major distributors, manufacturers and others interested. But the main purpose of these studies is to break down for each marketing area the significant data pertaining to that area, projected for a five-year period into the future. The study on population is typical of the method which will be employed with the other data books of this type to follow on housing, appliance saturations, uses, etc.

The first one contains a foreword which sets forth the philosophy behind this service to the electrical industry performed by the research organization of the utility.

It then explains that these tailored studies applying to specific localities should aid a dealer to plan his own postwar personnel and appliance requirements, promotional schedules and other related merchandising activities. It also announces future studies of the same kind on housing, customer purchasing power, appliance saturation and past sales records, appliance markets—potential and early postwar, and the availability of appliances.

The first study divides the system into trading areas, comments on population trends and on domestic customer trends. There follows a trading area map for this specific division with data on the population trends in that area and the domestic customer trends, which are then projected for each year from 1943 to 1950. The segregation is made between electric and gas customers, with a total of both.

For months the sales staff personnel under O. R. Doerr, general sales manager, have been gathering this information from each of the division sales staffs. The information is being correlated and as fast as it is finished will be printed and distributed to the trade.

This planning work is the individual company development of the over-all planning suggested to the utilities by the planning committee of Pacific Coast Electrical Assn., of which R. E. Fisher, vice-president in charge of public relations and sales of Pacific Gas and Electric Co., is the chairman. The idea back of it is to provide that branches of the industry, whose facilities are not such that they can make such surveys or gather the information as accurately perhaps or as extensively, may be aided by the utility in the setting up of strong and well-planned postwar programs of their own.

Bendix Rides Again

First dealer meeting since 1940, and with all the old nostalgic trappings and mannerisms of appliance heydays, was the Bendix washer dealer meeting in San Francisco, called by the Leo J. Meyberg Co., California distributor for Bendix home laundry. Held at the Mart Club in the Western Merchandise Mart, San Francisco, Oct. 18, it drew a large number of dealers from the northern California area and feasted their hungry eyes on a gleaming appliance spotlighted in blue against a red plush curtain.

Later the curtains parted to give them another jewel case punch, when the illuminated display pieces for postwar (or sooner) were unveiled. The dazed and so long suppressed dealers and salesmen were slow to applaud at the customary places, but they did come out of their daze to sign up for the variety of neon signs Bendix offered them at half cost, installed.

"Now do I get the first washing machine Mr. Davis?"
Courtesy Thomas & Betts Co.

The idea that there actually may be some Bendix automatic washers again seemed too good to be true at first. They thought what they saw was a mirage.

As what Cash J. Laufersweiler, West Coast sales manager for Bendix Home Appliances, Inc., told them sank in, the dealers realized that, despite its preoccupation with war orders, Bendix has moved its washer machinery and assembly line to a non-critical area, set it up ready to go, has manpower available and only needs the release of materials to start grinding out its porthole washers at a prodigious rate. Realized also was the competition there would be for franchises. So the signs were signed for, so were the jewel case display pieces, and the pre-invasion literature and advertising material.

Dealer meeting sales talk is a lingo of its own to which Laufersweiler adds several of his own embellishments. It was good to hear such optimistic and product-proud eloquence again. It was good to hear that automatic washers should enjoy a market as big as that which only refrigerators have known before. He brushed aside competition, except that of the cross-licensed Westinghouse, asserting that a patent fence plus two-and-a-half years head start would give his company's product such leadership that none could catch up.

Present users number 350,000, he said, and Bendix expects to make 600,000 the first year it gets into stride. Surveys tell of the eagerness of the public for fully automatic washers. The first off the line will be a new model, too, with 17 improvements over the last, not the mere 1941 model continued.

Bill Lancaster of Meyberg took occasion to make clear his company's distribution policy. "We are committed to a retail policy of distribution through independent dealers," he said. "We will limit the number of dealers so as to assure adequate volume and profit." There are five applications for dealerships for each one that can be accepted, he explained. This policy, he declared, will apply to distribution of Meyberg's four major lines—RCA-Victor, Norge, Bendix and Eureka Vacuum Cleaners.

Lancaster also said Meyberg would handle the American Central all-steel line of kitchen cabinets and sinks, a new dishwasher line, a line of electric sewing machines, table appliances, lamps, and continue its recently added electric supply and electronic supply lines.

Russell Christensen acted as chairman of the meeting. Similar meetings of Bendix dealers are to be held in other parts of the West and by other distributors.

Electric Scarecrows Guard Crops

Lydia L. Anderson

COASTAL regions along the Skagit Flats of Washington are now defended by electric scarecrows from the damaging inroads of migrating ducks, which in winter threaten the seed crop fields of the area. Since 1942, approximately half a dozen of these oscillating lights have successfully kept the invaders on the wing.

The latest development is a 110-volt 180-watt beacon consisting of six special type reflector-sealed beam units arranged in a rectangle, two across and three down on a shaft. This is operated from a sealed weatherproof box containing a transformer, a time clock, actuating gear, a motor, and the oscillating mechanism. Since there is only a six-volt operating current through each light, it is safe from weather and can be used even under water. The purchasing price is $200.

In 1939, the oldest revolving floodlight was rigged up with an old washing machine motor, which caused the light to alternate in half an arc. Elmer L. Johnston of La Conner, Wash., built this emergency protection for Joseph Macmillan, who first conceived this scheme for saving his 40-acre crop of cabbage seed plants. To date he has continuously improved the device.

On the Skagit delta, wild fowl, especially the widgeon ducks, have created a problem of prime importance. Approximately 8,000 acres of rich alluvial soil are devoted to the growing of seed crops, particularly cabbage, turnips, table beets and, since the beginning of the war, spinach. In 1942, five million pounds of vegetable seed were produced. Statistics indicate that the cabbage seed business is almost a Skagit monopoly, an estimated 95% of the marketed product being raised there. Today more than ever, this bottleneck industry, capable of supplying seed for millions of tons of vitamin-C rich food for the world, must be protected.

During the months of December, January, and February, the marauding ducks may be seen flying low in flocks of a thousand or more. It is then that the plant shoots start their second season of growth and hungry fowl who alight in the fields are capable of ruining up to 40 acres in a single night.

What, then, can the seed grower do to protect his crop? The ducks are safe under the regulations of the federal Fish and Wildlife Service, who, nevertheless, consider this their No. 1 problem as far as Skagit County is concerned. To date only lights have kept the saboteurs away from the cultivated fields.

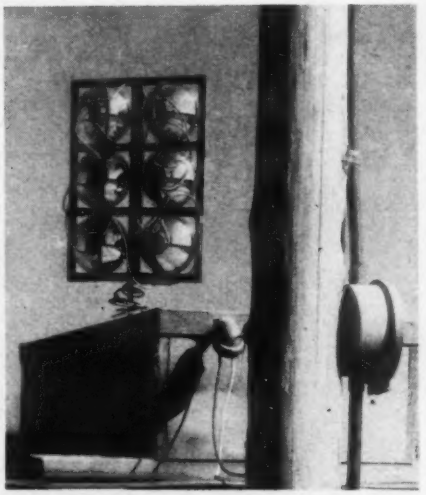
Several disadvantages of the earlier lamps have been overcome. In 1940, Macmillan purchased a Westinghouse searchlight, which cost him $300, and a reflector. The life of the 1,000-watt bulb was approximately ten days, but since the crop might be greatly harmed over night should the light go out, he had to check it daily. Then, too, there was the discoloration of the reflector to be considered. The operating cost was between nine and ten dollars a month. By 1941, this was replaced by a horizontal arrangement of eight lights. (EWEST, July 1941).

After Pearl Harbor, when coastal dimout regulations were put into effect, the scarecrow seemed doomed but, so successful was the grower in convincing the military authorities of its necessity, that he finally received permission to continue its use.

News of the beacon got around. Another seed grower, although skeptical, turned to Johnston. Due to the war, there were by this time difficulties in getting materials. After two days of fruitless searching in Seattle for a suitable transformer, he removed the 150-watt unit from his son's electric train and built the light at a cost to the owner of $250. The crop was saved, the farmer was convinced, and the light is still operating in its original form. Since then Johnston has received a dozen transformers, some of which already have been installed.

The adequacy of this protective lighting is dependent upon its location. Most farmers have found it satisfactory to place it on a pole near a fence line. It may be raised from two to twenty feet above ground, but ordinarily the higher the better. Alternating at a 180° angle, it is effective for at least 1,000 ft., covering a half circle, or nearly 40 acres. It naturally follows that, if the light were oscillated through a full circle, it would protect a circular area of approximately 80 acres. The beam itself is strong enough to agitate wild fowl at a distance of half a mile at least, but fog and other conditions cut down on the long-distance range.

Two advantages of this type of light are apparent. First, the operating cost is low, only about two dollars a month, if the light is used from twelve to fifteen hours a day. The total current consumption of the 110-volt line is about 300 watts. Secondly, its greatest asset perhaps lies in the fact that, with the six-unit arrangement, if only one or two bulbs go out at any time, its usefulness is still not lost. Thus, the operator needs to check his lamp only once in ten days or so.



Rear view showing wiring arrangement of multiple-unit oscillating searchlight now in use on the Skagit delta

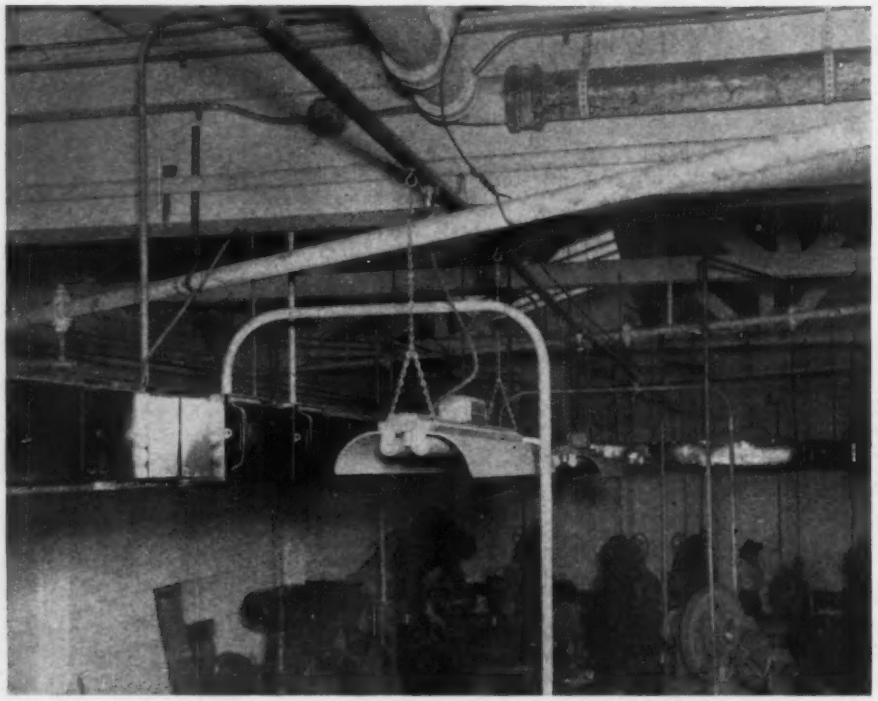
For the present no patent is available. Johnston feels that the only possibilities for manufacturing these flashing lights on a large scale lie in simplifying the operating mechanism. If the light can be oscillated electrically rather than mechanically, a smaller weatherproof box can be used. Then, too, the shaft upon which the reflectors are placed can come right up from the chest and the entire contrivance can be set in motion to and fro. The whole can then be made smaller and easier to handle. Also, the cost of manufacture will be materially reduced. But any experimentation at the present time is impossible because of the wartime restrictions upon materials.

Nevertheless, the soundness of the principle and the practicability of the multiple-unit oscillating searchlight have been definitely established. Fish and Wildlife officials acknowledge that, to date, it is the only successful means of controlling the wild fowl, with the exception of shooting to kill. Whether or not fowl will in time become accustomed to the disturbance and the invention lose its effectiveness is now only speculation.

Just how far the use of this method for controlling wild life will be extended no one can tell. Generally the farmers are becoming convinced of its effectiveness. Moreover, it is expected that the same type of protective lighting will be put to a further test in the rice fields of the Sacramento Valley in California.

Plant Flexibility from Bus

War expansion installation points way for many



Tap for a motor below made through the conduit looped at the center of the picture into a disconnecting bus connecting fitting plugged into the bus duct. Closed apertures for other points of connection may be seen also. The trolley duct runs along the joists.

UP TO ITS EARS in war production of bronze bearings, Kingwell Bros., Ltd., 444 Natoma St., San Francisco, expanded its machine shop facilities and offices through to Minna St. What system of electrical distribution would offer it the most flexibility for postwar reconversion? This question was put to its neighbor, Stone-Ryals Electric Co. Moreover the new installation had to go fast.

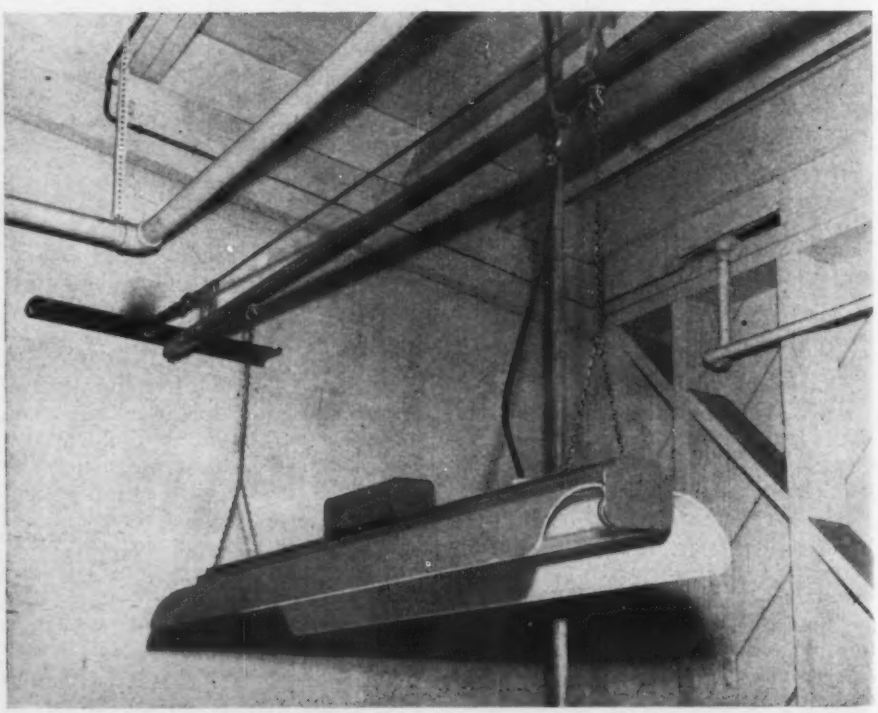
This problem looked to F. H. Styles, superintendent for Stone-Ryals, to be one for which bus duct and trolley duct would offer the most advantages in flexibility as well as speed of installation. Mechanically, too, it appealed to the machine-minded Kingwell organization. After war orders cease and the shop needs to convert to peacetime products, any machine can be moved any place and be served conveniently and adequately, with a minimum of time and materials.

First the main service into the basement was increased to 800 amp., with a new Square D main switch with adjacent current coils. Service is received at 240 volts, three phase, three wire. Then to serve the new shop bus connections were taken from cables inside a gutter, up through the ceiling to the street floor, and from a disconnect there run in six 250,000 circ. mil. cables, two per phase in parallel, in 3½-in. conduit to the new plant on Minna St. The cables were then terminated in a pull can to which the bus duct itself was connected.

There are two sections of bus duct, one of 600-amp., the other 400-amp. capacity, put together in an L-shape down the length of the room and across the end. The duct is supported on and braced by ⅝-in. round rods suspended from the roof trusses about 8 ft. from the floor. Duct is BullDog BUStribution duct with slotted openings for connection to the buses every 18-in., staggered on opposite sides of the duct, covered by a metal plate.

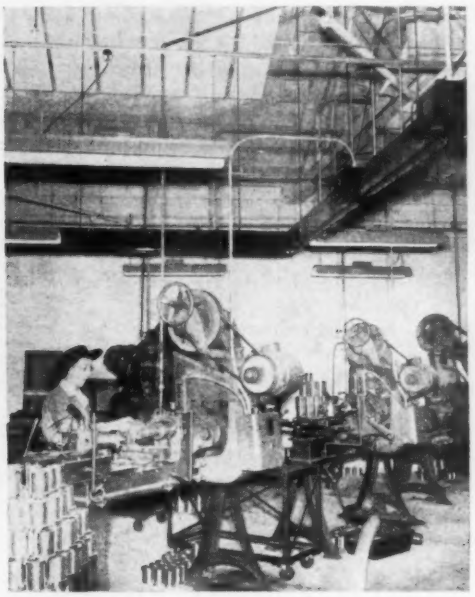
Each machine in the new shop has individual motor drive. All motors are three phase, 220 volt, and range in size from 15 hp. to fractional. The machines are placed diagonally in relation to the walls. Connections between motors and the bus duct are made through the special disconnecting bus duct fitting, a run of conduit down to the automatic starter and pushbutton and motor on each machine.

For greater safety, the California Industrial Accident Commission required that the disconnecting fittings be placed on the bus duct over aisles



Detail of how a two-lamp industrial fluorescent fixture is suspended and fed from the trolley duct. Chains terminate in a locknut-equipped device which fits the lower turned-back rim of the duct channel. Electrical connection is made with a special plug, which fits into the duct and is given a quarter turn to connect with the insulated buses inside. A clamp holds it tight in set position.

At left, shop area showing the bus duct arranged in L-shape at the rear and trolley ducts supporting lighting fixtures. Below, shows a typical tap to the bus duct to serve a machine tool with its individual motor drive, autostarter and push button control.



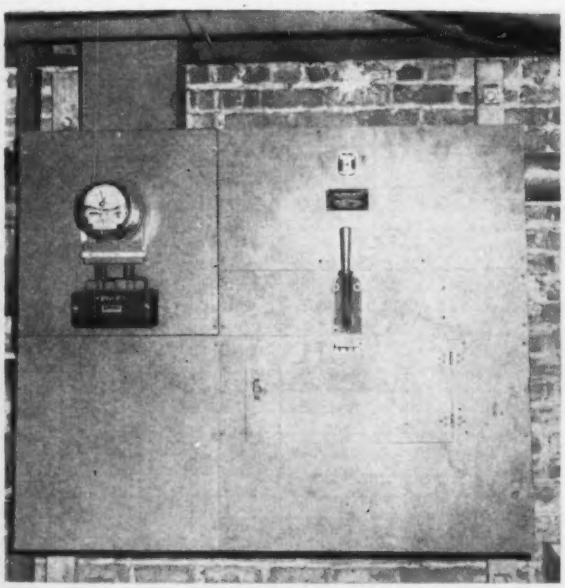
between machines rather than directly over the machines. Thus a man on a ladder disconnecting the circuit at the duct fitting would be working in the clear. The fitting, when opened, automatically disconnects the motor it feeds and also pulls out the fuse block so that fuses can be changed clear of the hot buses.

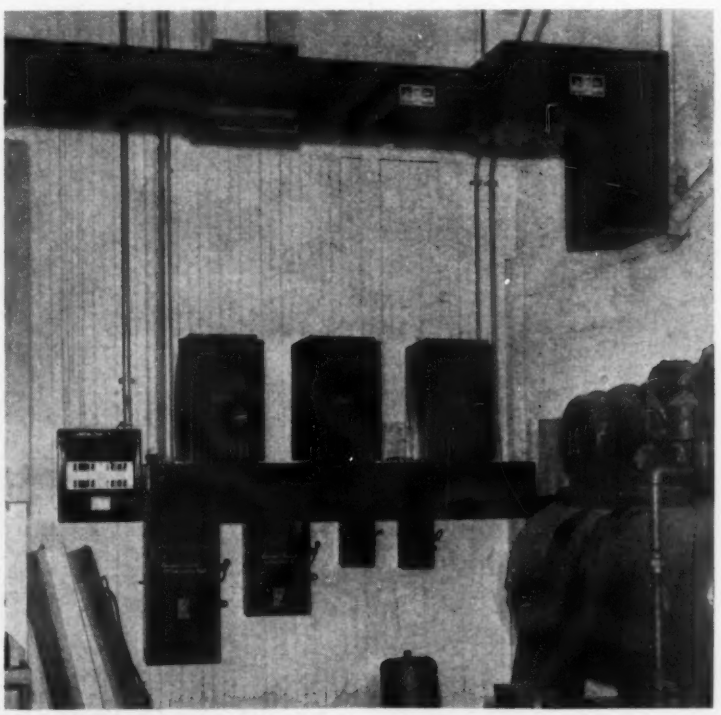
Lighting for the plant was both supported on and fed from six parallel runs of 30-amp. BullDog trolley duct, each 65 ft. long, and made up of 10- and 5-ft. sections. This trolley duct is supported by ⅜-in. galvanized steel messenger cable, stretched between turnbuckles the long way of the building between angle-iron supports bolted to the walls.

All lighting at present is from two-lamp, industrial fluorescent fixtures using 40-watt lamps. The supporting chains terminate in a special fitting, equipped with locknut, which rides in two parallel grooves at the bottom of the trolley duct. The locknut holds it fast, yet the fixture may easily be moved to another position on the duct to fit the special lighting needs of the machine below. Connection is made through a cord to a special cord-grip socket, with a clamp to circle the duct. This fitting goes up into the duct and a quarter turn makes connection with the two strips of bus along each side of the trolley interior, insulated from the duct. A quarter turn disconnects the fixture, too.

- Trolley Duct

postwar conversions





Above, the new 800-amp. main switch panel with space for current transformers and meter panel. At right is entrance of the bus duct to shop area, with the lighting transformers and switches below

Lighting is supplied from three dry type 10-kw. transformers which are fed directly from the bus as it enters the shop. The transformers are mounted on a piece of gutter directly below the bus duct where it enters the room.

Advantages to this type of installation for the small machine shop are the same as those for larger installations. The duct goes in quickly, it makes a neat installation, provides ample capacity with negligible voltage drop and makes changes possible to accommodate shifting of machines or lighting units with the least loss of material. A short run of conduit from the machine to the bus-tapping fitting may be lost as against a long run back to the panelboard.

In making changes the fitting is pulled free of the duct, the metal plate rotated back in place to cover the duct access openings, and a new place assigned to the fitting near the new location of the machine it serves. Either bus duct or trolley duct can be extended easily by adding prefabricated sections. Where permitted portable tools may be conveniently fed from trolley duct, a grounding connection being provided by the duct itself.

At Kingwell Bros. the new installation has proved so satisfactory that the old plant too will be changed over to individual drive, bus duct served, and better lighting, served by trolley duct, as soon as materials are available.

Lighting of the new office at Kingwell Bros. is described on the Lighting Idea page of this issue.

Prices and Taxes

Government regulation and taxes nowadays give contractors many a headache never experienced in the old days of free and easy running of their business to suit themselves. The small business especially has had to take on the clerical work and accounting which only the big companies could afford in previous days. While this may be a benefit in some instances, it is a heavy load in others and many a small contractor wonders just where to start.

California contractors who visited the Chicago Electrical Contractors Assn. on their way to the National Electrical Contractors Assn. convention last month had an opportunity to pick up a chart, reproduced herewith, developed to aid in a problem of this kind. Walter Collins, manager of the Chicago association, explains that the chart illustrated herewith is one that deserves study by any contractor doing a repair service business on a small scale. The dealer has now been asked to set ceiling prices based on his previous costs of doing business and to justify them to the OPA accountants. If he has a study of his business on the items in the chart with his own figures for costs and percentages, he will have a basis from which to derive just treatment in the allocation of operating costs to the prices he must obtain. In the examples given the total operating costs enumerated are 42% of the combined labor and material costs, the material service cost is 32.2% of the material purchase price, and labor burden is 46.4% of the pay roll.

Another matter which cannot be emphasized too strongly is the necessity for contractors to develop a base period of operating costs and profits for dealing with the Treasury Department in matters of income tax. There is a tendency on the part of the Treasury Department to take the period from 1936 to 1939 as normal for the entire building industry. This base period is not fair to the electrical contracting industry and to take the building industry as the base likewise is not just. Over 40% of the electrical contractors' business is done without any connection with the building industry. His business is entitled to a sustaining profit because of the lean years which occur quite frequently in between years of heavy building activity.

The importance of studying the business individually over a long period to cover ups and downs in order to arrive at a fair base period or base rate will be realized if the arbitrary figures now being assumed by the Treasury Department are imposed upon contractors and they are unable to defend their own status.

Failure to have figures on which to stand can cost a contractor much of whatever profit he has made to tide him over until construction starts up again. If the war continues long, new construction may be delayed for some time.

REPAIR SERVICES
(ELECTRICAL)
STUDY OF OPERATING COSTS FOR BUSINESS AS FOLLOWS:-
4 MECHANICS (AV.) EMPLOYED 44 HRS. 1.70 PER. HR. AV. WAGE
DIV. OF BASE COST - 30% MATERIAL (PUR. PRICE), 70% LABOR (PAYROLL)

ANNUAL VOL. - BASE COST		
	PAYROLL	15,600. - 70 %
	MATERIAL	6,666. - 30 %
	TOTAL	22,266.

OPERATING COSTS

ITEM	REMARKS	COST PER YR.	DIVISION MATERIAL DOLLARS	%	DIVISION LABOR DOLLARS	%
ADMINISTRATIVE						
SUPERVISION						
ENGINEERING	BY PROPRIETOR - 100.-/WK.	5,200.-	1,040.-		4,160.-	
ESTIMATING						
PURCHASING						
SELLING						
STOREROOM ATTEND'T.						
BOOKKEEPING - GEN.						
BOOKKEEPING - SP. TAXES	35.00/WK.	1,820.-	546.-		1,274.-	
STENO. & OFFICE ATTENDT.						
RENT - OFFICE	50.00/MO.	600.-	180.-		420.-	
RENT - STORE RM						
LIGHT	6.50/MO.	78.-	24.-		54.-	
HEAT		125.-	25.-		100.-	
TELEPHONE	12.50/MO.	150.-	30.-		120.-	
OFFICE FUR. & EQUIP.	0.25 % OF 22,266.-	56.-	11.-		45.-	
STORE RM. BINS, RKS., ETC.						
STATIONERY & SUPPLIES	0.50% OF 22,266.-	111.-	22.-		89.-	
POSTAGE	0.40% OF 22,266.-	90.-	18.-		72.-	
TAXES & LEGAL EXP.	0.25% OF 22,266.-	56.-	11.-		45.-	
ADVERTISING & DONATIONS	0.20% OF 22,266.-	45.-	9.-		36.-	
COLLECTING BAD DEBTS	0.10% OF 22,266.-	22.-	5.-		17.-	
INT. ON PAYROLL	0.50% OF 15,600.-	78.-	-		78.-	
TRAVEL EXP.	LIGHT TRUCK	600.-	210.-		390.-	
CARTAGE						
TOOLS - CONSUMED & DEPR.	1.75 % OF 15,600.-	273.-	-		273.-	
MISCEL.		85.-	17.-		68.-	
TOTALS		9,389.-	2,148.-		7,241.-	

TOTAL OPERATING COST — 42. % OF COMB. LAB. & MAT. COSTS
MATERIAL SERVICE COST — 32.2% OF MATERIAL (PUR. PRICE)
LABOR BURDEN -- - - - - 46.4% OF LABOR (PAYROLL)
NOTE:- INSURANCES INCLUDED IN PAYROLL

Who

Sunland Industries, Fresno, Calif. Design by R. B. Branum, lighting specialist, San Joaquin Power Division, Pacific Gas and Electric Co.

The Need

The previous installation consisted of two industrial type units with two 40-watt F lamps, giving only from 5 to 7 f-c. Complaints of headaches and frequent trips to the oculist brought need for action. Each employee's requirement was tested with the Luckeish-Moss visibility meter, convincing the management.

Installed

Three rows of three Mitchell URC luminaires with four 40-watt F lamps in each, shielded and diffused by ribbed glass. Shortened stems were used because the cove ceiling would not permit proper spacing with ceiling mounting.

Results

Average illumination is 88 f-c maintained, with 110 f-c of horizontal illumination on desk tops. Maximum ceiling brightness 162 ft.-lamberts; maximum fixture brightness from normal viewing angle 375 ft.-lamberts; brightness of walls 5 ft. above floor 56-ft.-lamberts; of walls at ceiling 62 ft.-lamberts; two feet below ceiling 60 ft.-lamberts.

Employees all pleased. Month-end jam eliminated by increased ease of work performance.

LIGHT FOR OFFICES
fluorescent

The Need

Adequate office illumination for accounting and clerical work on day and night shift war production work.

Conditions

Office is 30 x 70 ft., with 10-ft. ceiling. Walls and ceiling of sound deadening materials, painted a soft apple green.

Installed

Two rows of Mitchell URC luminaires, each with four 40-watt F lamps; a total of 12 fixtures on approximately 8½-ft. centers. A single fixture was installed in each of the private offices, of which there were six.

Results

After a month of burning, average illumination is 40 f-c.

Who

Kingwell Bros., Ltd., 444 Natoma St., San Francisco. Office in new addition. Design by F. H. Styles, superintendent. Stone-Ryals Electric Co., San Francisco, installing contractor.

A-W—It Can't be Sold on the Hoof

But the Rocky Mountain top hands aim to learn to throw the critter even if it takes a wiring college education while waiting around

George E. Lewis
Manager, Rocky Mountain Electrical League

LIKE an untamed rodeo steer, Adequate Wiring, making its initial appearance in the electrical arena, came charging out of chute No. 3, ready to provide a big thrill to the crowd. But the top hand scheduled to bulldog the lunging newcomer with the A-W brand must have been looking out the window or down his nose. At any rate, he didn't dash after him to climb his neck and pin his horns in the dust 'mid the plaudits of the crowd. So the unthrown critter won an unearned decision, by default.

Ever since this ill-ended premiere, ol' A-W has virtually been an unclaimed maverick, solitarily wandering the wide open spaces of the electric range. Every time he edged up to browse with some herd, in the hope he could join up, he'd find himself on the receiving end of a snub or just barely tolerated. Even though he came from a good strain of stock and had been regularly calved under careful supervision of some of the best breeders of kilowatt and copper-consuming ideas in the industry, he simply didn't click, except among a paltry few open-minded souls.

All of which shows that adequate wiring can't be sold on the hoof, even to those who are supposed to fatten or process it for the millions that need it.

Adequate wiring started out well-sponsored and well-rehearsed for the important role it was to take in the electrical drama. NEMA and other godfathers lavished it with good wishes and tucked a bit of spending money into its pockets. Leagues and associations cheered as it trudged on its uncertain way. In fact, the whole industry got behind adequate wiring. And it is still behind it—behind so far it is going to be hard to get un-behind it.

Adequate wiring is the ugly duckling of the industry—no oomph—and too much ugh! Because of its very nature, wire could not be made glamorous, even if it were charged with high-voltage sex appeal and garbed as seductively as a June bride in a midriff nightie.

Lack of appeal is one of the secrets of adequate wiring's lack of progress. Folks in the industry just can't go into ecstacies or wax jolly over wire, wrapped or in the nude. This lack of lure prompted efforts to graft into its infertile anatomy some sort of an invigorating gland. But the public's mind and the walls of its dwellings still are not even slightly pregnant with wiring, adequate or otherwise.

A transfusion of slogan plasma and a diet of ringing words and phrases were prescribed by some of adequate wiring's well-wishers. All of the good slogans having been used up by others, some of the electric gentry opined that adequate wiring might ride pick-a-back on some of the snappy breakfast food or soap-selling sayings.

"Say it With Wire" and "A.W., the Initials of a Friend" instantly came to mind. Even a series of "Wireside Chats" was included among the brainstorms that raged at the time.

One of the electrical leagues launched a slogan contest among its members. However, hardly anyone knew enough concerning adequate wirnig to coin a phrase about it. Moreover, the name was so uninspiring that the slogans that were eked out didn't seem good even to those who submitted them.

Adequate wiring has always been something that has kept buck passing a national pastime. From its inception, adequate wiring was always turned over to two other fellows, both of whom gave it over to the tender care of some "little man who wasn't there." It got so that the process of ignoring adequate wire actually reached syndicate proportions, extending to every section of the country. Big shots indulgently listened to arguments and logic favoring adequate wiring and its uses and the absolute dependability of the industry upon it. Then they shifted the thing to George or somebody else to forget for them.

To the credit of the industry, it has been in unanimous agreement that something "oughta" be done about wiring. And, encouragingly, there are almost as many who believe that something has "gotta" be done. In this respect, the industry has been goaded by information-seeking members of the public.

So far, these inquisitive members of the public have been turned away with the impression that they had been prying into a military secret. Which wasn't the case at all. The industry—except for a scant few—simply just didn't know any more about wiring than those who were so woefully displaying their ignorance.

The electrical contractor has taken the attitude that, after all, it is the utility that eventually will sop up all the gravy coming from the use of a lot of wire. The contractor himself always has gotten along by using just as little—or less—wire than the other fellow. So, why shouldn't the utility take the lead in promoting lavish use of wire? He'll put it in, if folks insist hard enough.

The distributor and manufacturer, who smuggly and patiently wait for wire orders to come in voluntarily.

opine that both the contractors, who get the first benefits of wiring, and the utilities, final and continuous beneficiaries, might, at least, stir up a little effort to get more wire sold. And the utility opines that the distributor, contractor and manufacturer are a triad that is just a "natural" for getting everybody to go on a year-'round wiring spree, if they want to move their stocks—and only had the get-up to do so.

Let's Try Prohibition

It is apparent that some kind of a new or altered technique must be employed to make adequate wiring register with those who are doing such a good job of shunning it. Maybe it should be made somewhat risque or erotic. Conceivably it might be made a misdemeanor or even a capital crime. Like the whispered-about village bad girl, it would intrigue and involve more persons than it does in its present chaste state. Then, like necking, folks could knock it all they wished, but it still would be popular with the masses.

Then take the element of fear that might be employed by the industry to promote the use of more wire. Folks can't be scared into running wire all over the place and turning their walls into a sieve of outlets by telling 'em their homes'll burn down if they don't. A "Better Wire-Less Fire" slogan wouldn't click. For most people carry insurance, the premiums for which are paid for with what they saved on wiring they don't have.

Nor can folks who now loudly complain of their electric bills be impressed with what they'd save in money, lost time and wasted electric energy. Mom and the ol' man are still getting war wages and the government'll support everybody in the future anyhow.

So granting that there is no magic or some secret formula for lifting adequate wiring by its bootstraps and sending it along the royal road to success, there remains but one course to follow—rugged, persevering, unspectacular coolie labor and sweat, with the whole industry passing the ball instead of the buck.

OK, Let's Go to Work

In the Rocky Mountain area, a group of hardy pioneers is exploring virgin territory in its march on the wiring frontier. Singularly, they have the much-condemned "public-be-damned" attitude in pursuit of the industry's will-o'-the-wisp.

"'The public be damned' so far as adequate wiring is concerned, until we know something about it ourselves —and can pass it on," is the philosophy that has grown out of a series of recent meetings of the Adequate Wiring Bureau of the Rocky Mountain Electrical League. Despite the constant and well-directed efforts of the National Adequate Wiring Bureau, members of the industry in the mountain region are still "babes in the woods," so far as a knowledge of and the necessity for intensive promotion of wiring.

So while the league has founded an Adequate Wiring college for the members of the industry of Colorado, New Mexico and Wyoming, it is, in reality, just a come-on, so far as the name is concerned. Actually it is a kindergarten or primary school where classes will be taught to creep before they walk and, eventually, rush out into the wide world to spread the gospel of wiring.

T. M. Foulk, manager of the appliance service department of the Public Service Co. of Colorado, Denver, chairman of the Wiring Bureau, is head of the faculty, which already has been organized. The first semester is scheduled for this fall, in Denver, with students from every part of the league's territory.

While a publicity committee has been formed, to prepare newspaper advertising copy, radio scripts, pamphlets and other material for public consumption, including material now available through the National Adequate Wiring Bureau, it will not even approach its duties until members of the industry are sufficiently enlightened to meet requests for information, advice and guidance as to their wiring problems. Too many such requests already have been made with too many people being turned away by too many representatives of all branches of the industry. A speakers' committee also has been formed; but it, too, will not begin to function until its members can ably present the adequate wiring story to architects, builders and the public generally.

Final details of the league's new departure in the adequate wiring field and its break-away from the old buck-passing pastime are in process of formation now by the newly elected president and committees of the league. Having given up the theory that the world owes it a wiring, the industry has decided that, if it has to do it the hard way, it had better take an apprenticeship and learn the trade and get itself a kit of tools and have at it. There's time now to get set before wire itself actually appears on the market again.

Contractors' Chance

Business of maintaining F-lamps much needed by the public

One thing that general usage of fluorescent lighting has demonstrated has been the need for regular lighting equipment maintenance. In this situation, an opportunity exists for electrical contractors to develop a lighting maintenance business for a number of small stores and offices and factories which do not have sufficient such work to justify keeping a full-time maintenance man. It has even been suggested that a maintenance organization to take care of domestic electric and mechanical equipment, now so widely used, would be a good idea in a great many cities.

Sign maintenance is now undertaken by a number of sign companies. This includes cleaning of the sign and replacement of tubes and general checking of electrical facilities. Regular service contracts are signed with customers covering such sign maintenance service.

Similar service undoubtedly could be developed on a contract basis for the cleaning of fluorescent fixtures, relamping where necessary, checking of starters and ballasts, and generally servicing the lighting installation. It has been suggested that charges be based on a per lamp per month basis with differentials for mere maintenance or for complete washing of the unit so many times per year.

The average store neither has the ladders and equipment for cleaning nor wishes to bother with the maintenance problem, yet would be willing to pay a fee to have this cared for by a qualified organization. One electrical contractor, the California Electric Works, San Diego, developed a good business for the maintenance of lighting equipment at gasoline service stations, assigning a truck fully equipped for the purpose to this job as a permanent day-to-day assignment. It is obvious that the business should be handled as a separate department and not attempted as a side issue to be done between other odd jobs of the contractor.

● An Industrial X-Ray and radium inspection laboratory is to be established in Spokane by Robert Taylor, industrial radiologist on the staff of the State College of Washington and manager of the light metal alloy foundry at Washington State College. The laboratory is to make tests on castings and products manufactured from magnesium, aluminum, bronze, iron or steel from the factories of that area.

ELECTRICAL WEST

McGRAW-HILL COMPANY OF CALIFORNIA
68 POST ST. SAN FRANCISCO 4

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When They Come Home

NO one who sees and reads the booklet, *You and Joe and His Job,* which was "prepared, paid for and now distributed by the Pacific Coast Electrical Assn. for the mutual benefit of the returning service man and industry, and as a contribution to the war effort and to the peace to follow" can help being moved to admiration for so thoughtful and so kind a piece of necessary work. Certainly it puts to shame all the bigoted demogogic charges that private industry is soulless and thinks only of profit, for here is so human, so understanding and so practically helpful a guide to business managements in the preparation for taking back to jobs in civilian life of servicemen and women that it makes one proud of the leaders of this industry.

With a realistic appreciation that "the man who returns to your employ will not be the same man as the one who left," that he will have difficulties of adjustment if he is not more affected or disabled, it makes clear that the responsibility toward him does not end when he is given a new job. Modestly, too, it does not offer its suggestions as a cure-all. Frankly it declares that they are not a substitute for brain work and planning by individual companies and executives. The job is not so simple.

But the book does state the employer's moral obligations and reminds him of his legal ones. It treats of such difficult problems as seniority and reallocation of jobs where a man has advanced his knowledge during his service in the armed forces, or has been incapacitated for his former job by wounds or illness, whether physical or neurophychiatric.

One of its finest sections is that devoted to the desirability and the morale strengthening need of maintaining contact with employees while they are in the service. The very assurance of their being wanted back and that there is a job waiting for them is proved by actual letters from men at the battlefronts telling what this moral support from their former companies has meant to them.

This is truly a devoted work, and a solemn credit to those who take their responsibilities seriously and with real humanity of heart.

Nothing Else Need Be Said

LOW costs and low rates do not always turn out to be the support-winning arguments which the advocates of public ownership expect them to be. The case of the San Francisco street railways contradicts this most common claim of the zealots. But it took a newspaper in a small community in a sister state to focus attention on the facts. The editor of the Oregon City *Enterprise* recently recounted the competitive travails of the business managed street railway in attempting to operate against 5-cent municipal competition. The "nickel fare" was a political slogan which elected candidates but cost the taxpayers plenty in money and in strained patience over poor service. In his editorial, *How Public Ownership Works,* he described the situation and then said: "When the two systems were consolidated last week under public ownership, the publicly owned system announced an increase of fares to 7c. Nothing else need be said."

Power Lines and Air Fields

TIME may come when locating a right-of-way for a transmission line may produce more headaches than it does at present. Take the recent predicament of the line department of a California power company as an example. Ordered by the Army to remove lines (a second time at that) from a rapidly expanding airport, the engineers set out to locate the line "to hell-and-gone away from any air fields." The new location passed relatively close to a large semi-rural high school. Imagine the surprise and chagrin of the engineers when a protest was registered by the school officials to the effect that the new location would be a serious hazard to the school's proposed

new airport. This is going Nebb's comic strip gubernatorial candidate, Judge Niblick, one better. Instead of an airport for every town, it would appear now as though in the future it might be an airport for every school. Which might lead to a counter slogan for Britain's new "cradle to the grave" plan—"from perambulators to airplanes."

Postwar Distribution Planning

WITH 1.5 million kilowatts of spare generation to be marketed postwar, all of which must find its way to the consumer through distribution systems, engineers of the West are keenly alive to the problems that confront them. This is amply evidenced by their planning and thinking as expressed in ELECTRICAL WEST'S symposium on distribution to be found in this issue.

The trend is definitely toward higher distribution voltages in the 11-14-kv. class to meet the greater residential load densities expected. Another trend brings the unit metal-clad distribution substation prominently to the front.

On the score of low-cost rural lines to match REA cheap construction, it is revealing to find that utilities of the West are fully abreast of this problem. Replies indicate that they have developed better lines at about comparable cost, lines that stand up better and give better service.

Some intensely interesting and valuable information has been brought out in this symposium. It merits careful study by utility engineers and manufacturers alike.

Announce Policies Please

UTILITY commercial managements delay the programs and policies of manufacturers, distributors and dealers when they do not decide and make known their own policies in merchandising. For if a utility plans to enter direct selling the whole industry must adjust to that policy. If it plans not to be in direct selling but to devote its efforts to the promotion of sales and the creating of desire for electrical products, then the industry must plan a distribution set-up to do the active selling.

While it may appear to be of no concern to anyone but the utility involved, this is no longer true. The extent and the nature of utility selling, the policies, the market adjustment to such a decision, all affect dealers and distributors and manufacturers intimately. If the war surpluses of power are to be re-employed quickly through civilian usages, the utilities need the help of these others in the industry and need it intensely. To develop that help quickly and to insure its immediate readiness, policies must be established and announced now.

WHEN wise men look into the future they appropriately give thought to the past. A glance back into prewar days reveals an inspiring picture of electrical progress in the Pacific Northwest that is a compliment to the high endeavors of those that were partners in its making. Using a customary standard of measuring the popular acceptance of electrical equipment, we find an average annual domestic kwh. use in the five Northwest states well in excess of 2,000 as compared with a national average of 1,070. In the two decades before the war, we saw the electrical appliance business grow from small isolated operations in the 20s to a substantial volume in 1941. Today the manufacture and distribution of electrical appliances takes top ranking as "big business." . . . The appliance business did not just happen to grow into big business. Its growth was planned and created progressively by the entire electrical industry working in close cooperation. Low-priced electrical energy, available from the beginning by the operation of the "inducement rates," which were pioneered in this territory, has paved the way for a widespread acceptance of appliances by the public. Parallel with this went the extension of electric lines and facilities by the utilities and a forward looking policy of developing capacity ahead of requirements. The integrity of the manufacturer in developing quality products came into play, making for added stability. Then, after sporadic selling attempts, came highly organized promotion and selling campaigns, joined in by manufacturer, distributor, utility, electrical contractor and appliance dealer, backed by the advertising of national cooperative organizations. These factors, coupled with a high quality of salesmanship and good business ethics, have given the Pacific Northwest an enviable record . . . . [postwar] loosening of pent up desires will produce a situation replete with electrical sales opportunities in the home, on the farm, in the commercial field and for industrial needs. Let us prepare now to grasp and develop these opportunities with zeal. In so doing we will not only advance our own individual fortunes and those of the electrical industry, but we will fit our industry into the pattern of a sound peacetime economy, by creating business, making jobs, and contributing to better living in the American way.—J. A. Hale, president, Northwest Electric Light & Power Assn.

McCammon

Militant RMEL Girds Itself

Strong industry necessary to face reconstruction problems and fight its battles with socialism

ALTHOUGH the event was scheduled simply as a Fall Conference, implying localized interest, Rocky Mountain Electrical League's meeting in Denver, Oct. 2 and 3, took on the aspect of a national convention, bringing in speakers and subjects whose purview took cognizance of industry as a whole and touched lightly, if at all, on regional matters.

Every branch of the electrical industry, including manufacturers, distributors, contractors and utilities from the area served by RMEL, heard militant leaders in the fight to preserve free enterprise name the destructive forces undermining business in general and power companies in particular.

Kinsey M. Robinson, president of the Washington Water Power Co., Spokane, featured and final speaker on the two-day program, called for coordinated action by the electrical industry to do a bang-up public relations job in acquainting the nation with some highly pertinent facts: That the privately operated electric utilities of the United States have accomplished what no other industry can boast — uninterrupted and adequate service alike to war industries and civilian demand. ["Twelve times in eight years the Federal Power Commission has warned that a power shortage was just around the corner, and twelve times it has been wrong," he said]; that of 187 big holding companies under fire by the government, only 17 were electric utilities, yet these 17 were pilloried by the partisan and inspired press to such an extent that the public was indoctrinated with the idea that privately owned electric companies are all wicked and the cause of all economic evils; that 10,000,000 kw. of generating capacity have been added to the nation's resources in the past four years without installation of any new equipment, simply by the formation of power pools, a demonstration of managerial competence by private operators; that encouragement by government of federally sponsored, federally financed electrical projects and cooperatives places an intolerable tax burden on free enterprise—an incubus that will prove fatal unless curbed; that private capital will be available for reconversion to peacetime production and immense pay rolls, if government shackles on management and crippling taxes on earnings are eased.

"The electrical industry has a proud record of accomplishment," Robinson declared. "I'll tell it wherever I find an audience. What we need is a coordinated public relations activity which will tell our story to the nation and allow power executives to go back to their jobs, instead of spending their time defending an industry that needs no defense."

John E. Loiseau, president of Public Service Co. of Colorado, largest public utility in RMEL territory, placed a verbal wreath on the holding company's grave: "It served a big and useful purpose, notwithstanding abuses, in that it gave electric service to thousands of communities which otherwise would have been without this benefit; it developed lines and systems that would not now be in existence. Independent management will go ahead on the foundation built by the holding company without being under the compulsion of consulting the parent organization for guidance on policy. The holding company is a thing of the past; R.I.P. The good it has done will live; its evils are buried."

Lost, a Billion in Taxes, by Vernon Scott, vice-president of the National Tax Equality Assn., Chicago, got down to bedrock in a survey of cooperatives throughout the nation. "Private business would have little objection to the cooperatives, if their growth were accomplished on the basis of equal competition, on the basis of that equal justice under the law which our forefathers tried to guarantee to every American. But the nub of the whole story is that the co-ops can grow faster than other businesses, in private ownership, because they pay no federal income taxes. While independent enterprise is paying 40% corporation tax, plus up to 95% excess profits tax, a total of 80% of its earnings, cooperative enterprise, doing exactly the same kind of business, in exactly the same way and making the same profits, pays absolutely nothing in federal income taxes."

Scott cited the Farmers' Union Grain Terminal Assn., a northwestern co-op founded in 1938, as an index to the situation: Its original capital was $30,000; it borrowed $30,000 from the government. Each year it made money, $200,000, $500,000, $1,000,000; and in the five months prior to its annual meeting in October 1943, more than $1,000,000, while its balance sheet showed a net worth of nearly $4,300,000, reserves over $1,000,000, and assets almost $25,000,000. Profits during 1943 were reported to members at $2,000,000. A private business making $2,000,000 last year, Scott pointed out, would be paying in corporation and excess profit taxes at least $1,400,000. The co-op pays nothing.

This pattern of operation, said Scott, will eventually put private enterprise out of business. He further cited the fact that nobody knows how many government enterprises are now in existence or how much taxpayers' money has been invested in them; a guess would be a minimum of 25 billion dollars, including four great hydroelectric plants, the REA, etc., etc., all tax free and competitive with private enterprise.

Another who attacked the government ownership menace with bare knuckles was Harry Hall, president of Klau-Van Pietersom-Dunlap, Milwaukee, Wis., public relations counsellors. His philosophy that : "Folks will vote to preserve free enterprise only if it costs them nothing," is drawn from the observation that a housewife (and her husband) will vote for municipal ownership, if there is an immediate prospect of lopping off 50 cents or $1 a month on the light bill. He condemned, in the same breath "the bond boys from La Salle and Wall streets selling free enterprise down the river for a few points profits on the (municipal ownership) bonds." This leads, Hall insisted, to the doctrine that an appeal to voters, on muncipal owner-

ship or any other controversy, must be on a dollars-and-cents basis, showing them how much *money* they will save by preserving private enterprise.

The paper of C. E. Greenwood, Edison Electric Institute, New York, on *The Postwar Trend in Appliance Selling*, was read by George E. Lewis, RMEL manager, in the absence of the scheduled speaker. Greenwood believes utility companies will be well advised to gird their loins for aggressive selling of merchandise after the war. His thesis: "There will be an inter-industry competition of the house construction versus the automobile dollar versus the electric dollar, and so on down the line. We require a united industry to obtain our share because competition will be keen, and all-powerful sales forces will be required to fight the battle of industry." Merchants generally, particularly electrical dealers, welcome the prospect of power companies in the appliance-selling field, because of their greater facilities for pioneering and advertising, but they will scrutinize closely *how* the job is done. A program of merchandising procedure is in process of being worked out, whereby retail stores and utility sales forces may compete on a mutually agreeable basis under regulations applying to the over-all, or national, picture.

At the conclusion of RMEL's October conference, the organization enjoyed the unique experience of having three presidents in one day! By executive committee action, the new officers were inducted into active service immediately, instead of waiting until Jan. 2 as has been the traditional habit. Art Prager, president of the Albuquerque Gas & Electric Co., Albuquerque, N. M., was unanimously elected to head up RMEL for the ensuing year. A president's reception to honor C. C. Baker, retiring president, and the new incumbent, was held.

Lewis Prager

Pictured at the RMEL Denver rally are: Thomas W. Hughes, Sheridan County (Wyo.) Electric Co.; W. D. Johnston, Mountain States Power Co.; Casper, Wyo.; K. M. Robinson, president Washington Water Power, Spokane, and one of the speakers; H. H. Lenhart, Cheyenne Light, Fuel & Power Company

Then Prager, on orders from his physician, announced he would be unable to serve and the executive committee, hastily convened, elected F. F. McCammon, vice-president and superintendent of electric operations of Public Service Co. of Colorado, to fill the vacancy so suddenly created—a choice enthusiastically endorsed by the membership. Thus, within a span of 24 hours, RMEL was blessed with three presidents, two outgoing and two incoming. (If the arithmetic is vague, a detailed survey shows: McCammon and Prager incoming; Prager and Baker outgoing.)

The remainder of the RMEL elective slate was undisturbed: Vice-presidents for the ensuing year will be E. T. Tengdin, Inland Utilities Co. Española, N. M.; W. D. Johnston, Mountain States Power Co., Casper, Wyo.; L. R. Storey, Home Gas and Electric Co., Greeley, Colo., and Ross H. Adams, Hendrie and Bolthoff Mfg. Co., Denver, W. C. Sterne, president of the Arvada Electric Co., Arvada, Colo., and Harry Adler of the same firm, were re-elected treasurer and assistant treasurer, respectively. George E. Lewis was again appointed manager.

McCammon announced the appointment of personnel to direct the various league divisions during his administration: K. W. Kissick, Trinidad Electric Transmission Railway and Gas Co., Trinidad, Colo., chairman of the Utility Section; A. S. Anderson, General Electric Co., Denver, Manufacturers Division; E. L. Garihan, Mine and Smelter Supply Co., Denver, Distributors; Ralph E. Johnson, Sturgeon Electric Co., Contractors: Ray Jones, Ray Jones Washing Machine Co., Denver, Retailers; H. T. Rankin, Public Service Co. of Colo., Sales; W. D. Virtue, Public Service Co. of Colorado, Accounting; Lloyd W. Edwards, Mountain States Power Co., Casper, Wyo., Engineering. C. C. Baker, retiring president, Colorado Central Power Co., Golden, Colo., and Art Prager were named, respectively, chairman and vice-chairman of the General Section.

Executive committee members, drawn from the above list, are: Kissick, Anderson, Garihan, Johnson, Jones, Rankin and Baker, to serve with the vice-presidential cabinet and treasurer.

With an imposing list of committee members and an ambitious program for the year, the Electric Club of Los Angeles, Inc., began its fall season recently. New President, Roy Martindale, Los Angeles Department of Water & Power, announced a list of committee appointments with the following heading the various committees: Attendance, Karl G. Kempf, Thomas & Betts Co.; Civic & Inter Club Relations, Charles S. Shryock, Columbia Steel Co.; Fellowship, T. L. VanLaw, Southern California Edison Co.; Finance and Auditing, S. W. Murray, California Wholesale Electric Co.; March of Electrical Time, Bradley Cozzens, Department of Water & Power; Membership, Edwin H. Galchutt, Graybar Electric So.; Public Policy, A. D. Brown, Allis-Chalmers Mfg. Co.; Publicity, R. O. Christiansen, Pacific Electric Railway Co.; Program, R. C. McFadden, Southern California Edison Co.; Special Events, R. B. Borland, Westinghouse Electric & Mfg. Co.; Sports, D. G. Kendall, Square D Co.; Visiting and Welfare, Arthur H. Howard, Tri State Supply Co.

The Electric Club was incorporated on Aug. 1, 1944 through member attorney Rollin C. Woodbury, of Edison company.

M. J. Lampurdi, proprietor of North Bay Electric Works, San Rafael, Calif. has been appointed chairman of the Bay Cities Chapter, National Industrial Service Assn., Inc. for a term ending March 31, 1945. William Boyd, Pacific Electric Motor Co., Oakland, and Keith Noble of the same company were elected vice-chairman and secretary-treasurer for the same period. Noble announced also the affiliation of three new members in this motor dealers' organization, O'Keefe, the Fan Man, San Francisco, Scott-Butler Electric Co., Oakland and Roy Butcher, San Jose.

Westerners Bring Back NECA Report

More representation on board of governors and consolidation of all Western divisions started

INAUGURATING a new type of representation by means of a board of governors selected to represent individual chapters, the National Electrical Contractors Assn., 43rd annual meeting at French Lick Springs, Ind., Oct. 1-6, was attended by an exceptionally large number of Westerners from four chapters in Seattle, Spokane, San Francisco and Los Angeles. Because of a consolidation of two divisions into one, there was also a contest in the election of the vice-president for Division Six between the only two eligibles, Grover Burke of Seattle and A. L. Stone of Los Angeles, the union shop-open shop issue entering into the contest in its final stages. Stone was elected vice-president.

It was a significant meeting in many respects, meaningful to both contractors and to the International Brotherhood of Electrical Workers, with which NECA is in close relationship. Both organizations, through a postwar planning committee, have been studying the business outlook for contractors and the employment outlook for electricians. These studies encompass apprenticeship training for the large influx of unskilled so-called electricians made necessary by the war, as well as returning servicemen. They also go into the possibility of working out an annual wage program to take out the deep dips into unemployment and no contracts between jobs, filling them with a steady electrical maintenance program, perhaps on a reduced but steadier annual wage rate. Another part of the program has been a study of the possibilities of conducting a national advertising program to sell contractors' services.

From an organization standpoint, the meeting was important too. Instead of an executive committee of 12 to determine policy, a board of governors, one from each chapter, was initiated to this policy making responsibility. The governors from Seattle Chapter, Grover Burke, Northern California Chapter, T. L. Rosenberg, Oakland, and Los Angeles Chapter, Richard Arbogast, participated actively in this first policy meeting and Rosenberg was selected to head a committee to study and make recommendations on standards for chapter operation, dues, management and extent of territory. Rosenberg is president of the Northern California Chapter.

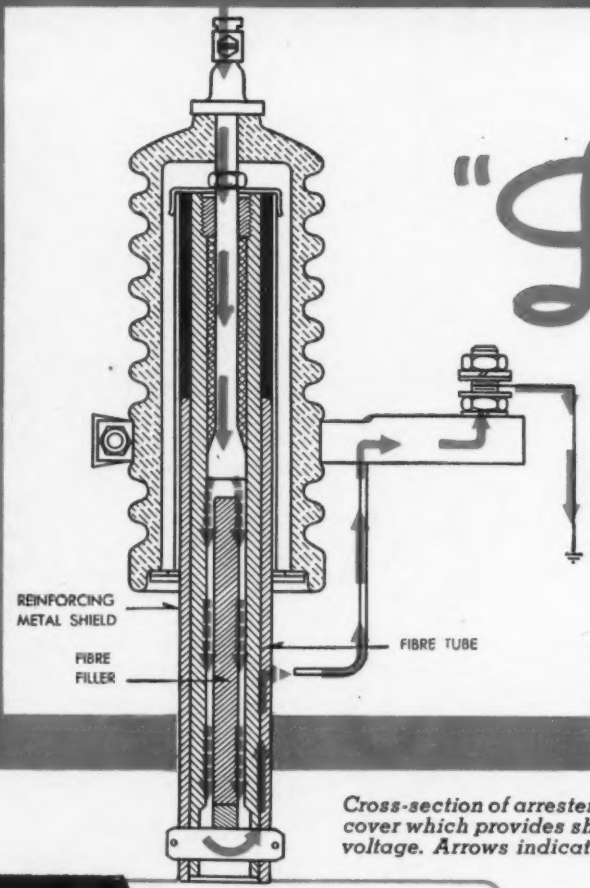
Too late to be scheduled on the program but presented by proxy was a paper discussing the legal significance of the decision of Judge Yankwich in dismissing the anti-trust case against the San Francisco Bay region contractors, associations and unions. This was prepared by Walter J. Walsh, attorney for the San Francisco association, and read for him by W. A. Cyr, secretary, Northern California Chapter. One evening was then allocated for full discussion of the case and of the operation of independent bid depositories, with Edward Buttner, Scott-Buttner Co., Oakland, chairman of the Electrical Bid Depository of California, Inc., presiding, assisted by Clyde L. Chamblin, San Francisco contractor, member of the national labor committee of NECA.

While the papers presented and the major actions taken will be reported in the official publication of NECA, *Qualified Contractor*, a few of the significant items of information from the convention follow:

Major construction in the East and Middle West already has started downward, as war plants and army installations have been completed. Contractors in those regions must depend upon reconversion for renewed activity. The acute labor shortage on the West Coast and in war production centers has drawn nearly all available electricians away from localities of inactivity to the production centers. Probable relaxation of WPB's limitation order L-41 is expected next year, if the European war nears its end. This may release materials for a resumption of house building and small commercial alterations and modernization.

NECA is in the strongest financial condition in all its history. Although its membership is not large, it is on the increase because of active field work by a staff of six division representatives. W. J. Varley, representa-

Northwesterners, above: Paul Heydon, Spokane; Russ Horning, Archie Morgan, Grover Burke and C. F. Meagher, all of Seattle. Below, the Californians—top row, W. A. Cyr, C. B. Kenney, T. L. Rosenberg, John Busey former Californian, Warren Penn, A. L. Stone, Clyde Chamblin. Lower row, Howard Nicholas and wife, G. J. Bennett, Mrs. Kenney, W. J. Varley, Mrs. Arbogast, Richard Arbogast and A. R. Linn. Westerners not pictured were Ed Buttner and Tom Drury

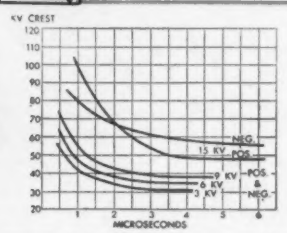


THE WESTINGHOUSE TYPE A "De-ion" LIGHTNING ARRESTER

FOR 3-15 KV DISTRIBUTION CIRCUITS

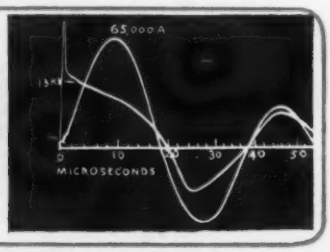
Cross-section of arrester, showing fibre filler and metal cover which provides shielded gap with low sparkover voltage. Arrows indicate current flow after sparkover.

LOW IMPULSE SPARKOVER



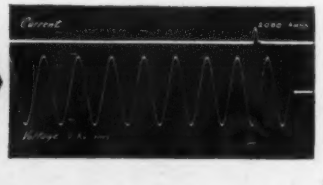
Impulse sparkover time to sparkover characteristics (1.5 x 40 microsecond waves).

LOW IR DROP



9-kv arrester discharging 65,000 amperes. Note how voltage collapses immediately after sparkover.

1/2 CYCLE INTERRUPTION



Power follow current interrupting test on a 10,000-ampere circuit showing ability of arrester to interrupt in one-half cycle with no system disturbance.

Equipment and lines on 3-15 kv distribution circuits gain better protection with the Westinghouse Type A "De-ion" lightning arrester. Construction and operating principles prevent transformer insulation breakdown and also reduce fuse outages.

A special shielded gap holds the sparkover voltage materially below the withstand voltages of transformers and other line equipment.

This arrester handles surge currents of 65,000 amperes and when discharging even these high currents, its IR drop is extremely low—approximately line voltage. This lower voltage across the arrester relieves the stresses on other insulation.

The Type A arrester has unusual ability to limit and interrupt quickly a wide range of power follow currents, regardless of the system capacity. This valuable protection is accomplished by restricting the arc space with a fibre filler and de-ionizing the arc stream, so that the gap insulation strength at the first current zero will withstand restored line voltage without further arcing.

For complete information, ask for descriptive booklet B-3417. Westinghouse Electric & Manufacturing Co., P. O. Box 868, Pittsburgh 30, Pa. J-60563

Westinghouse

LIGHTNING ARRESTERS

tion for Division Six was the pioneer in this field activity. No matter whether income from dues drops or not, next year the field work will continue. The members were pledged this by Robert McChesney, president of NECA, and by Paul Geary, field supervisor and assistant general manager. Laurence Davis, general manager, in his report re-emphasized the same thing.

Davis foresaw a good year in electrical construction if L-41 is relaxed. Large stocks of staple materials are available. Only special items, such as elevators, may be delayed in release. He also declared that most of the objections contractors had to OPA's MPR-251 had been removed and a simple certification was all that was necessary now instead of a full estimate furnished to OPA. Davis cautioned that contractors should be sure their books are kept up-to-date with full information so that OPA auditors could be satisfied that contractors prices were not inflated.

Among the industry spokesmen who addressed the meetings was John L. Busey, president, National Electrical Wholesalers Assn., now president of General Electric Supply Corp. and a former Westerner.

Attending the convention from Seattle were Grover Burke, City Electric & Fixture Co.; R. D. Horning, manager Seattle Chapter; Charles Mars; Archie Morgan, Morgan Electric Co., Billings, Mont. and Seattle; C. F. Meagher, Mars Electric Co. From Spokane, there was Paul Heydon, manager Spokane Chapter. From the Northern California Chapter, there were T. L. Rosenberg, Oakland, president; W. A. Cyr, secretary; A. R. Linn, manager; C. L. Chamblin, San Francisco; C. B. Kenney, San Francisco; Tom Drury, Bakersfield; Edward Buttner, Oakland, and W. J. Varley, NECA field representative. J. Scott Milne, IBEW vice-president from San Francisco, also attended. From Los Angeles Chapter there were A. L. Stone, president; Warren Penn, manager; R. E. Arbogast, governor; C. J. Bennett, Bennett-Fosberg Electric Co.; Howard Nicholas, Nicholas Electric Co.

Joint Meet

Comparative figures on lighting of windowless plants as against conventionally designed buildings having skylights and windows, presented by Cyril F. Prideaux, project manager, Austin Co., in speaking to a joint meeting of the Illuminating Engineering Society and the Electrical Maintenance Engineers Assn. of Southern California, revealed that the costs were approximately equal. The windowless plants, however, had the advantage of uniform lighting intensities throughout the day, Prideaux illustrated. His topic was *Engineering 24-Hour Daylight to Master Manpower Problems* and was presented illustrated with slides of various huge projects which Austin Co. has constructed. He also presented statistical reports on the efficiency of lighting such plants with fluorescent units, some with RF lamps and other light sources.

Leonard A. Hobbs, Smoot-Holman Co., talked on *The Washington Picture of Lighting Priorities*, declaring that new types of lighting fixtures will not be coming on the market for some time yet because of critical shortages, both in materials and manpower. George M. Rankin, regional vice-president of IES, was scheduled for a report on the recent IES conference at Chicago but, due to the late hour, was unable to cover much ground. He gave a few highlights of the meeting, however.—Henry Bush, Editorial Chairman, EMEA.

Seattle Club

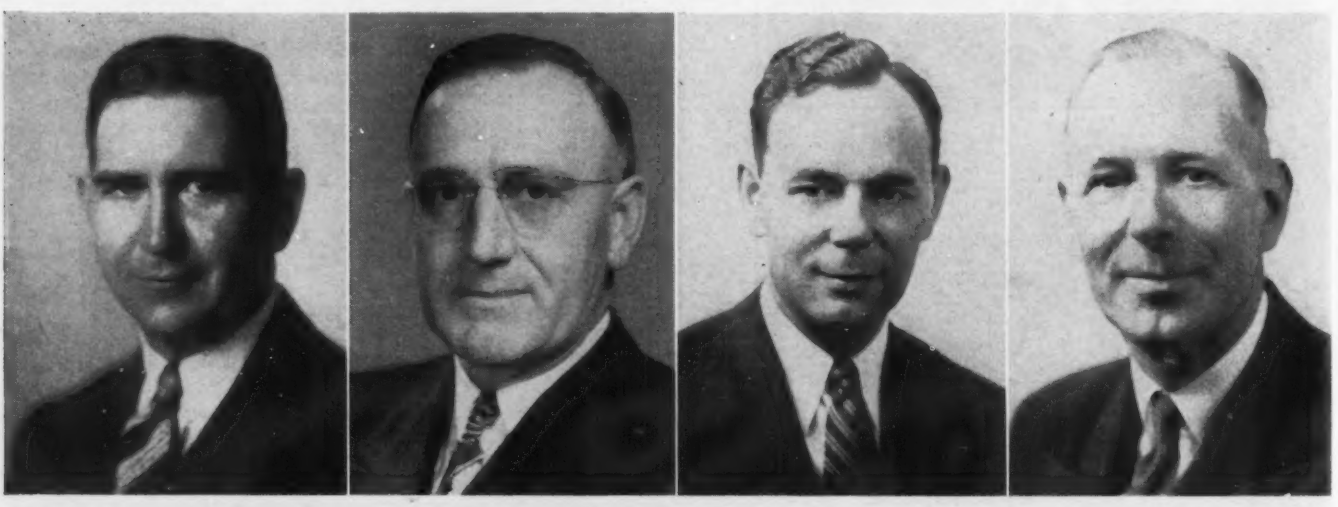
Roger A. Walker, assistant general superintendent, operating department, of the Puget Sound Power & Light Co., and former secretary of the Electric Club of Washington, was recently named president of this fast-growing state-wide organization of men of the electrical industry. He succeeds George Boyd, of the Westinghouse Electric & Mfg. Co.

Walker, long active in Electric Club of Washington affairs, received his B.S. in electrical engineering at the University of Washington in 1924, starting work with the Puget Sound Power & Light Co. in the service department immediately thereafter. From 1924 to 1929, he was a service dispatcher; from 1929 to 1936, a service supervisor; from 1936 until 1942, superintendent of service. He was named assistant general superintendent in 1942.

James W. Ferguson, superintendent of inside construction, Seattle City Light, was named first vice-president, succeeding R. D. Horning, secretary and executive manager of the Seattle Electrical Contractors' Assn. O. A. "Chick" Alderman was named second vice-president, succeeding Ferguson. "Dick" Church, superintendent of service, Puget Sound Power & Light Co., was named secretary, succeeding Walker, and Charles Allison, chief operating clerk, Puget Sound Power & Light Co., was re-elected treasurer.

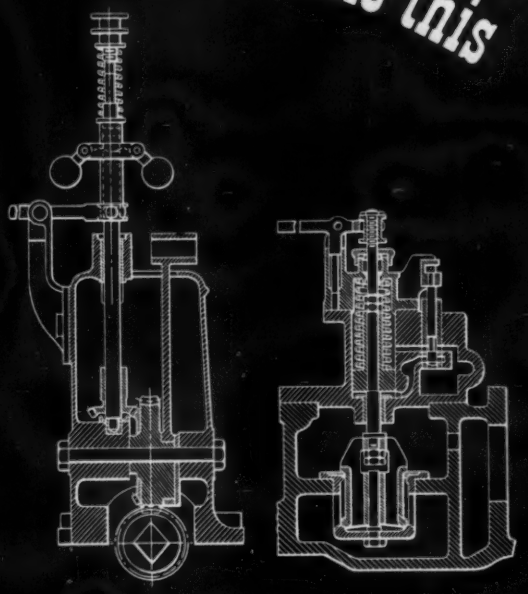
Trustees named were J. I. Colwell, Seattle manager of the Graybar Electric Co., Grover C. Burke, president of the City Electric & Fixture Co., and William Gaunt, business manager and financial secretary of Local 46 IBEW. J. D. Sparks, of the Ilg Electric Ventilating Co. is the holdover trustee and ex-president Boyd automatically becomes a member of the board.

Walker Alderman Church Allison



When GOVERNORS were made like this

Lubricating this "Gust Governor" of 1894 was no particular problem. Clearances were ample, mechanism simple. Steam was admitted in blasts, longer or shorter, according to the load on the machine. Attached to the spindle of the double-beat throttle valve was a piston which was normally pressed downwards by a spring above it. Steam leaking at a slow, but determined rate through the bushing of the spindle raised the pressure below the piston and so tended to keep the valve open in opposition to the action of the spring. The emergency shut-down device operated by releasing the steam under the piston of the double-beat valve, allowing the spring to hold the valve permanently shut. In modern types, oil pressure, instead of steam, is used to control the governor mechanisms.



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2. That has superior oxidation stability

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NEWS of the industry

RATE INQUIRY LAUNCHED BY ARIZONA COMMISSION

Ordering all Arizona utilities to show cause why their excess profits should not be returned to consumers in the form of rate reductions, the Arizona Corporation Commission in mid-October launched an inquiry paralleling current studies by the California Railroad Commission into excess profits taxes and utility rates.

All electric, gas and water utilities in the state were instructed by the commission to estimate their earnings for the period ending Sept. 30, 1944, and to report them by Oct. 28.

A show cause hearing was scheduled for Nov. 6 to inquire why utility rates should not be reduced during November and December to "eliminate excess profits income taxes," it was reported. Utilities also will be asked why they should not appropriately distribute resultant reductions among their consumers.

Utilities Testify in California Rate Case

War and postwar problems, not excess profits taxes, should be the main factor in fixing utility rates was the opinion voiced by utility representatives at a recent Railroad Commission hearing on wartime rates. The commission proposes to force reductions by elimination of the excess profits tax from base rates.

Present conditions must be taken into consideration, it was argued, so that utilities can meet shrinkage in revenues and problems of reconversion after hostilities cease.

Extraordinary problems of operation in California's war-swollen population centers which contribute to present, below normal operating expenses were cited by L. M. Klauber, vice-president and general manager of San Diego Gas & Electric Co. Power and fuel usages dictated by conservation rather than efficiency, fictitiously low losses on accounts, labor shortages and curtailed customer services, condoned only as a war inconvenience, were listed as conditions ending with the war.

At the same time, utilities are catering to an expanded population with temporarily expanded incomes, Klauber said. Effects of night shifts, changed eating habits, home canning and laundering and lack of adequate outside amusement facilities have temporarily increased demands upon utility services.

Effects of rate cuts now would be inflationary, E. B. Coyle, attorney for the California Electric Power Co. and Interstate Telegraph Co., told the commission. Return to rate payers of the asserted $100,000,000 potential purchasing power taken by excess profits taxes would create inflation, it was pointed out.

Ickes Makes Purchase Bid to Water Users Association

An offer of Secretary of the Interior Ickes to purchase the electric generating system of the Salt River Valley Water Users Assn. was being considered last month, according to Lin B. Orme, association president.

Price offered was $24,000,000. Other considerations were erasure of federal tax claims which have been pending for several years and right to purchase power for irrigation pumps at 2½ mills per kilowatt for 50 years.

Association officials questioned whether loss of their own power plants would increase irrigation costs. Sale of electricity has been instrumental in retiring bonded indebtedness, it was reported.

Meanwhile plans of the association to place its bonded debt on a long-term, low-interest base have been completed, with delivery to Harris Trust Co. in Chicago of refunding bonds amounting to $7,332,000. The new issue extends over a long period; bears a 3% interest rate. It replaces bonds maturing in 1948 and carrying a 4½% interest rate.

● THAT there is little probability of power development on the Green River in Washington was the opinion expressed in a recent report of Army Engineers studying a possible dam site six miles above Auburn. The study was in connection with an investigation ordered by Congress in 1936 to establish feasibility of a flood control project on the river. Extremely low summer flow probably would preclude hydroelectric development, the report said.

● HEARINGS on the feasibility of state control of the Central Valley project in California were to be held in Salinas, San Jose and San Francisco late in October.

UTAH COURT UPHOLDS ORIGINAL COST THEORY

Finding for the "prudent investment cost" theory of rate making, the Utah State Supreme Court last month upheld the state public service commission in ordering Utah Power & Light Co. to reduce its rates approximately 12%, or more than $1,500,000 annually. The reduction was made retroactive to Oct. 15, 1943, date of the original order; the case had been before the court since March.

At issue in the long drawn out case was the method of property valuation for determining a rate base. The commission held that valuation should be established at $63,970,254, based on actual investment as of Dec. 31, 1941. The company contended that "present fair value", not "original cost", should determine the rate base.

In its opinion, the court declared that, in the U. S. Supreme Court decision of last January involving the Hope Natural Gas Co., the "prudent investment cost" theory superseded the "fair value" theory. Utah statutes do not require the public service commission to use the "fair value" method, it was stated.

The decision was written by Chief Justice James H. Wolfe, with Justice Will L. Hoyt concurring but handing down an amended opinion.

Justice Wolfe said: "It becomes unmistakably clear that the commission rejected 'fair value' as a measuring rod for the determination of a proper rate base . . . and purported to ascertain the dollars 'prudently invested' in the acquisition of the companies property and the expense of integrating that property into a coordinated system. This prudent investment cost was adopted as the rate base upon which the company was to be permitted to earn a reasonable return."

At the time the decision was handed down, a total of $1,768,526 had been impounded pending outcome of the case and will be refunded.

● OPPOSITION to the creation of a Missouri Valley Authority and to proposals of the Army Engineers for development of the Missouri River was registered by Yellowstone Basin Assn. directors recently. At the same time they voted their support to plans of the Bureau of Reclamation for development of the Missouri Basin and pointed to the necessity of a compact among Montana, North Dakota and Wyoming for distribution of Yellowstone waters.

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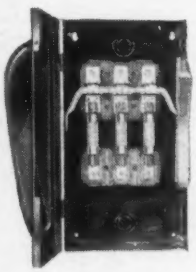

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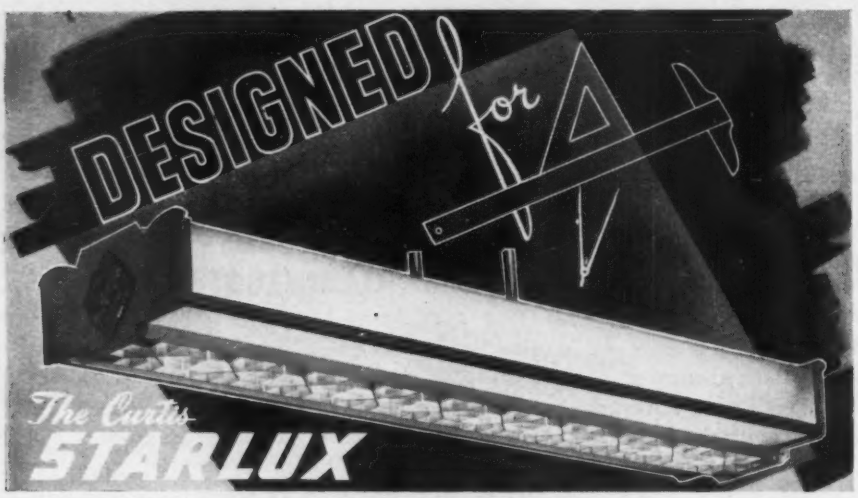

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Curtis StarLux is a four-lamp pendant luminaire which is far ahead in beauty and effectiveness. Engineered-design and quality manufacture combine to guarantee many years of efficient trouble-free service. Scientific shielding and low surface brightness insure eye comfort. The maintenance man will like this fixture too—the glass panels can easily be removed for cleaning when necessary—but lamps and starters can be replaced without removing any glass.

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STATES WOULD BAND TO HALT FEDERAL INROADS

Joint action to prevent new encroachments of the federal government upon state control of the West's water and power resources was urged by the Western Regional Council of State Governments at a recent meeting in Salt Lake City.

Formation of state compacts or adoption of uniform legislation enabling the states to create machinery for carrying out large-scale developments by joint and common effort was advocated.

Speakers cited as a reason for concern "consistent and determined effort of the federal government to create and perpetuate" government control of the development and use of water and other natural resources.

Group Denied Exclusion From Proposed PUD

Rejecting a plea by large landowners for exclusion from the proposed King County, Wash., PUD, county commissioners ruled that the proposal be put on the November ballot. The PUD would comprise rural territory adjacent to Seattle.

Representatives for railroad, lumber and power companies testified that the majority of land in the county not now served with electricity would not be increased in value by the establishment of a PUD, but decreased.

● A REQUEST by three citizens to place the "power at cost" issue on the Nov. 7 ballot was denied by the Redding, Calif., City Council on the grounds that it was made too late for action. Proponents of the plan would distribute Shasta Dam power at cost within the city. Opponents point out that loss of revenue from electric bills would increase property taxes. The municipal now buys power from Pacific Gas and Electric Co.

● APPEALING a district court decision, a group in Sheridan County, Wyo., has asked the state supreme court for authority to form a public power district in the county. The appeal to the higher court followed action of the county court in sustaining objections brought against creation of the district by the Chicago, Burlington & Quincy Railroad and the Sheridan Coal Co.

● AN $800,000 annual rate reduction was put into effect Oct. 1 by Montana Power Co. The cut followed negotiations between the utility and Montana Railroad Commission.

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Manufacturers! Apply this in terms of industrial equipment in *your* business. The problem's the same. Make sure you have ample electrical capacity to meet the huge future increases in electrical usage sure to come. In plants too, planned wiring will cost a lot less than unplanned wiring.

Before structures get out of the planning stage, it will pay to consult electrical contractor, utility power engineer, plant power engineer. They'll agree that it's always wiser to *Wire Ahead!* 44268

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Chance Pike Poles serve a double purpose. By removing the point and inserting this wire lifter in the same ferrule, linemen have an extra tool to use in lifting wire over derricks, into position on cross-arms, etc.

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HECO COMPLETES $4,000,000 STEAM PLANT ADDITION

Increasing generating capacity on the island 60%, the Hawaiian Electric Co. has completed installation of a 35,000-kw. turbo-electric generator in its No. 1 plant at Honolulu. The job required four years to complete and cost was more than $4,000,000.

Authorized in December 1940 in anticipation of rapid development of Oahu as a defensive base, history of the project is the story of a successful struggle against tremendous odds.

With the declaration of war, demand for electric power was at its peak, according to Leslie A. Hicks, president of the company, but work on the installation had to stop due to failure to secure materials. Excavation and construction had started, however, when the company was informed from Washington that the turbine ordered by the utility had been allotted to a shipyard in a southern state. With the help of the Army, Navy and local WPB, the company finally got the turbine reallotted in November 1942.

The unit is a Westinghouse machine and is operated from a single Babcock & Wilcox boiler, which produces a maximum of 390,000 lb. of steam per hour at 700 lb. pressure. Temperature of the steam is 905° at the outlet. The unit is the first on the island to use hydrogen gas for cooling in a closed circulating system.

In connection with the installation, the electric switch bay and boiler room of the plant were rehabilitated, a new basement was excavated and roof of the boiler room was extended to 120 ft. above street level. All old station main and emergency buses and all feeder disconnecting and oil switches were replaced by more modern equipment of larger capacity. The main switchboard was rearranged and rebuilt. This work was carried on while the 40,000-kw. plant was in operation.

The installation at Honolulu is only one step in the utility's expansion program, according to Hicks, who said that expenditure of more than $7,000,000 within three years is contemplated. Scheduled for operation in the fall of 1947 is a 35,000- or 40,000-kw. turbo generator at Waiau power plant in the Pearl Harbor area.

● SEATTLE CITY LIGHT will increase its distribution facilities in the central business district by installation of a $300,000 substation in the sub-basement of the City Light Building on Third Ave., it was announced recently by Superintendent E. R. Hoffman. It is expected that the station will be in operation within six months.

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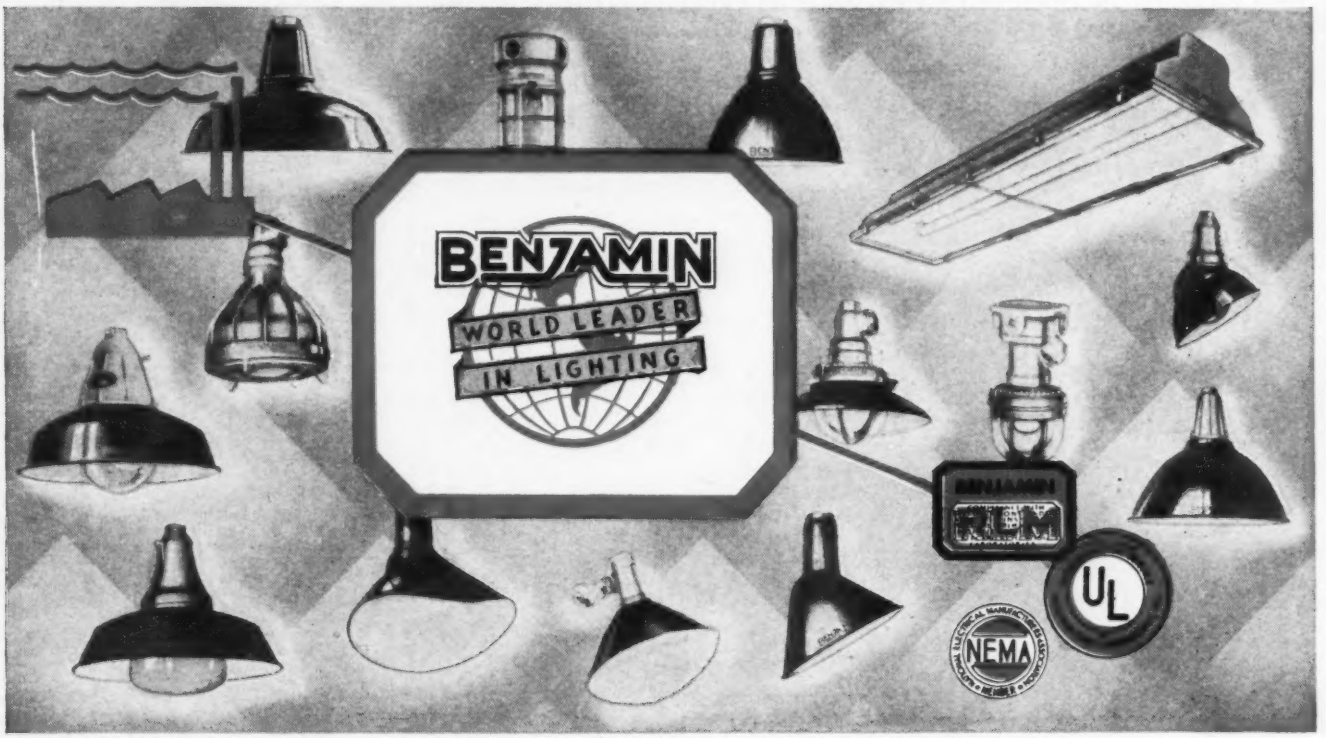

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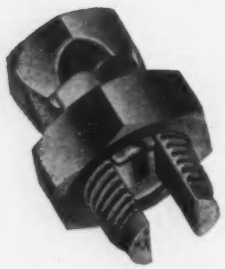

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by using solderless connectors with accurately fitting precision threads which insure easy, permanent installations.

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FPC HOLDS LAGRANDE DAM MUST COME UNDER LICENSE

Petition of the City of Tacoma for exclusion of the original La Grande plant from a proposed license for the two Nisqually developments has been turned down by the Federal Power Commission.

Pointing out that the old 32,000-hp. plant has been operated since 1912 without federal license, the city claimed that it should not be brought under license at this time. No change in construction and operation of the units will be made, according to the city, except to supply them from the new project tunnel rather than from the old tunnel and forebay. In time the present gravity tunnel, forebay and penstocks will be abandoned, it was stated.

FPC contends that, under the approved construction plan, the entire La Grande development is an integral part of the enlarged Nisqually operation and the old units are an essential part of the project.

In denying the petition, FPC extended the time for acceptance of the license, which will become effective Jan. 1, 1944.

New LaGrande Unit Will Go On Line in December

The 64,000-kw. La Grande unit of Tacoma City Light's second Nisqually project is scheduled to go on the line Dec. 31, according to Utilities Commissioner C. A. Erdahl.

To allow sealing of Alder Dam, about 1½ miles upstream, the old La Grande plant was shut down late in October. It was expected that water storage at Alder Dam would commence early in November and that power would be generated by spring.

Construction Begins on Power Line in B. C.

Construction of a 60,000-volt power line from Canada into the Metaline Falls, Wash., mining district was to begin about Nov. 1, it was announced recently by the Washington Water Power Co., which will build ten miles of the line from the Canadian boundary. Kootenay Power and Light Co. of Nelson, B. C., which will provide the power, is extending its lines a short distance to the border.

It is expected the Washington Water Power eventually will serve the mines and other industries in the region with its own electrical energy from Spokane.

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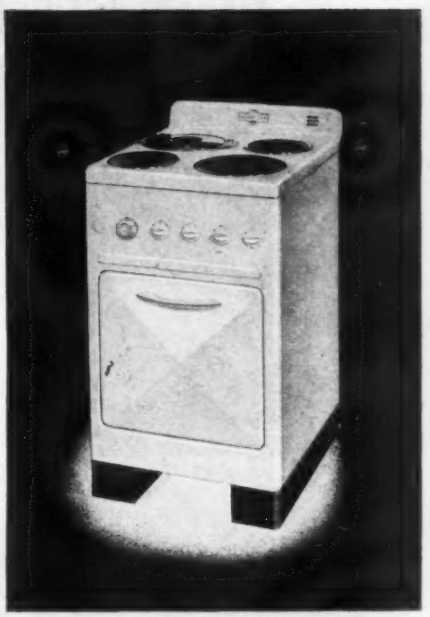
Such, for example, was the prewar Model 41-1, shown at right. Exclusive with Electromaster, it featured a 6-quart Vita-Miser cooker in a compact space-saving package. This model exactly suited the tastes and needs of many a discriminating American home-maker.

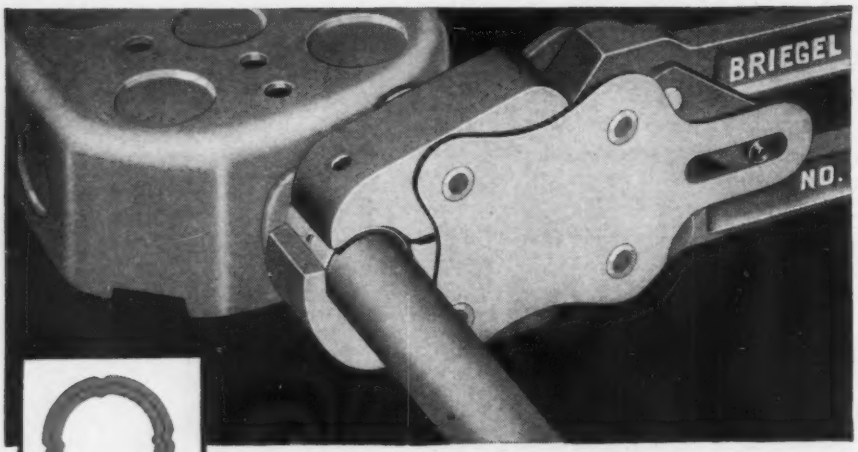
The new Electromaster models, just off the drafting boards of one of America's leading industrial designers, will be released for sale as soon as conditions permit. A limited number of preferred dealerships are still available.



ELECTROMASTER MODEL 41-1

Electromaster

DETROIT 31, MICHIGAN



Cross section Showing Indentations.

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GRAND COULEE-COVINGTON LINE NOW IN OPERATION

Bonneville's second 230,000-volt Grand Coulee-Covington transmission line went into operation on Oct. 6, 24 days ahead of the energization date originally set by BPA engineers. Construction was started in June 1943.

The 183-mile line utilizes both steel and wood towers and is the first on the grid to employ wood structures.

Power deliveries into the Puget Sound area will be increased by approximately 150,000 kw., bringing the total from the federal system to 350,000 kw. The line also is expected to increase the effective transmission capacity into the Portland-Vancouver area by about 100,000 kw.

Largest user of Bonneville-Grand Coulee power in the Puget Sound area is Puget Sound Power & Light Co., which is taking in excess of 100,000 kw.

Bonneville to Build New Line in Northwest Grid

With completion scheduled in mid-1945, construction by Bonneville of a high-voltage Columbia switching station near Rock Island, Wash., and a 51-mile, 230,000-volt steel tower line to the station from Midway substation near Vernita will commence in November or December, according to an announcement of the Bonneville Administration.

The line is designed to integrate the entire Northeastern section of the 2,700-mile Bonneville-Grand Coulee transmission grid and to permit delivery of additional power to war loads in the area.

Bids Called for Second Parker Dam Power Line

Bids for construction of a second power line from Parker Dam on the Colorado River to Phoenix, Ariz. were to be opened Oct. 31, according to announcement of the Bureau of Reclamation.

It was stated that the 140-mile line in general will duplicate the present line, which has a capacity of 90,000 kw. It was built in 1939 at a cost of approximately $1,000,000.

● REPAIRS have been completed at the Hydro Electric power plant of the Quesnel Light and Power Co. on Baker Creek in British Columbia. The plant, which serves the town of Quesnel, was struck by lightning which resulted in a fire several years ago.

RUSSIA

. Threat . . . or Promise?

WHEN this war is ended, two nations—the United States and Russia—will possess the bulk of the world's military and industrial might.

Whether this new situation will hold seeds of catastrophe or of unprecedented opportunity will be determined by policies . . . still to be formulated.

If this concentration of power leads to a bitter struggle for supremacy, then the world will be turned into a giant munitions factory.

If it is used cooperatively to maintain order, then, I believe, the stage is set for a long era of prosperity . . . and peace.

It is time that Americans, whether of the Right or the Left, face this basic issue squarely and open-mindedly.

☆ ☆ ☆

No group in this country has a greater stake than have business and industry in seeing that a satisfactory Russian-American understanding is reached.

Without such an understanding there can be no reasonable hope for more than a temporary and insignificant reduction of our crushing wartime tax burden. If the threat of a clash between these two giants impends, neither bankers nor governments will run the risk of lending on a scale adequate to maintain international trade at levels necessary for our future prosperity. Potential international customers, instead of buying freely in open world markets, will be forced—as during the dangerous period introduced by Hitler in the early 1930's—into the trading camp of whichever power they fear most.

If, however, Moscow and Washington will agree on cooperative plans for maintaining the peace, American business will enjoy enormous new trade opportunities after the war.

☆ ☆ ☆

Russia, during the three and one-half years since it was attacked by Hitler, has conclusively proved to a doubting world that it is a top-flight military power.

Soviet railroads did not break down under the strain of war.

Regions accounting for nearly 70 per cent of Stalin's key industries were engulfed by the invading Nazis, but before they fell, Soviet management engineers performed a near miracle by transplanting entire industries a thousand miles to the Urals with the loss of as little as four months' production in many cases.

Though American planes, trucks, and medical supplies have been welcomed by Moscow, fairness demands the admission that more than 98 per cent of American production has *not* gone to the Russian front.

Russian planning and *Russian* equipment won the victories of Leningrad, Stalingrad, and the Caucasus.

☆ ☆ ☆

But these measures of Soviet military strength—indicative as they are of an unsuspected economic development—fail to picture in adequate detail the startling potential of the Russian market after the war.

Russia, for instance, has two and one-half times the area of the United States.

It has a population of nearly 200,000,000, and this is increasing at the rate of 2,500,000 a year.

And statistics just released show that Russia has three times as many youngsters under 16 as has the United States. This is a measure both of war potential and of a vast commercial market.

And remember that in no part of the world before the war was per capita production rising as rapidly as in the Soviet Union.

☆ ☆ ☆

German armies occupied a region in Russia roughly equivalent to the territory in the United States north of Richmond, Virginia, and east of the Mississippi.

This huge area—with its counterparts of Pittsburgh, Buffalo, and Bridgeport; of Illinois corn fields, New York dairy farms, and Maine potato harvests—was *twice* subjected to the most withering destruction; first by the Russians themselves when they retreated before the Germans, and then by the Germans when they withdrew before the victorious Russians.

As a result, 30,000,000 people are in urgent need of complete reoutfitting. They need houses and shoe laces, trolley cars and baby carriages, tractors and livestock, hydroelectric plants and electric light bulbs.

Many of these needs will be met at home. It is doubtful, for instance, if Moscow will import cooking utensils or sewing machines, for many of Russia's huge war factories can quickly be converted to peacetime production of such consumer goods.

But for the rebuilding and expansion of her industries Russia looks to the United States for equipment.

Soviet representatives already are in this country with authority to negotiate for technical men and the equipment necessary to rebuild the great Donbas coal mines according to the most modern American methods.

It is important to remember that Russia's whole iron and steel industry, its non-ferrous mining and processing, some of its chemical production, much of its coke roasting and gas recovery, practically its entire automobile and tractor industry, and the largest of its hydroelectric plants, are based on American machinery and processes.

It is known among manufacturers that Russia recently has asked for bids on shipbuilding equipment, construction and roadbuilding machinery, alloy steels, textile machines, plastics, and a long list of rail, air, and water transport supplies.

☆ ☆ ☆

The Soviet Union, however, has more than a rehabilitation job on its drawing boards.

The first Five-Year Plan, which, as we all remember, was completed ahead of time in 1932, was devoted almost exclusively to heavy industry. Russia set out to build for itself the machines and the factories which, in later years, could turn out, at home, modern equipment for a vast range of light industries.

Stalin, when he inaugurated the second of his famous Five-Year Plans, promised that before it was completed Soviet factories would begin to turn out a flow of con-

sumer goods—ready-made dresses, canned foods, soap, cosmetics, shoes, kitchenware, automobiles, telephones, and modern houses.

But, by 1935, Moscow realized that Russia could not afford to enjoy such luxuries in the face of growing political tension in Europe. So, when the third Five-Year Plan was launched, there was no fanfare. Russians continued to wear their old clothes, to eat whatever simple food was available, and began grimly to build the industries which ultimately produced enough tanks, planes, and guns to turn the tide of battle at Stalingrad.

It is characteristic of Moscow that even before the last battles with the Nazis are over, Russia is planning to pick up its Five-Year Plans where the war had interrupted them.

Invitations to participate in a permanent exhibition in Moscow already have been mailed to American manufacturers. Soviet officials want their public to see samples of our new machine tools, aluminum and alloy products, oil-drilling machinery, bulldozers, and prefabricated kitchen equipment. Russia already is projecting specific plans to resume the job (1) of making the country an industrial giant comparable to the United States, and (2) of making life more pleasant for a long-suffering people.

☆ ☆ ☆

What is the measure of this postwar market in the Soviet Union?

Some estimates place the total quantity of goods which Russia might take from the United States during the first two or three years after the war as high as $5,000,000,000 a year. Then, as Russian industry is restored, imports from the United States might taper off perhaps to $2,000,000,000 a year.

Actually, these estimates are far too optimistic, unless the United States is prepared (1) to help Russia pay by buying vast quantities of Soviet raw materials, and (2) to provide large credits to handle the purchases during the first few years of rehabilitation.

The relations of American exporters with Russia during the period covered by the three Five-Year Plans have been eminently satisfactory. Moscow has met all of its obligations punctually; fifteen years of experience have reduced contract forms to the point where they cause a minimum of misunderstanding between the Russian representatives and the American producers; individual American companies with extensive prewar experience in handling Soviet business already are offering large credits on initial postwar orders though these may yet be replaced by large government credits at lower interest rates.

But the volume of trade with Russia after the war hinges upon Moscow's ability to pay. Never before the war did the United States buy more than $30,000,000 of goods a year from Russia. As late as 1938, Soviet exports to this country amounted to as little as $23,500,000, far less than enough to pay even the service charges on the credits which would have to be extended in connection with exports of several billion dollars a year. Only South Africa produces more new gold each year than the Soviet Union. But the United States does not want gold; more of it would only complicate the problem of controlling prices here.

If the United States, however, is to achieve, after the war, the high level of national income which is necessary (1) to keep our expanded factories in operation, and (2) to service the national debt, it might absorb from $90,000,000 to $100,000,000 a year of the kind of goods bought from Russia before the war—furs, timber, manganese, chromium, and handicrafts. But unless this volume of purchases from Russia can be boosted by another $50,000,000 annually, credits of the size necessary to fill immediate Russian needs could not be serviced without large supplemental importations of undesirable gold.

The nub of the situation is that Russia offers an extraordinary potential market particularly for our heavy industries which have grown so enormously during the war. But if this sales outlet is to materialize, then the United States must find a way to import from Russia (or from Russia's debtors if any) from ten to twenty times as much as we did before the war. Instead of merely going after the export business, American businessmen must explore with the Russians the possibility of buying bigger supplies of Soviet products.

☆ ☆ ☆

But more than the Russian market itself hinges upon sound cooperative action by the world's two leading military-industrial nations.

If trade between them is held to a minimum and if relations are strained, the flow of trade all over the world will be adversely affected.

Europe, long this country's biggest export outlet, certainly will never take the bold steps necessary to reconstitute its economy on a peacetime basis if Russia and the United States drift into a race for military supremacy.

The Balkan states, which may be industrialized by Moscow in order to reduce their dependence on Germany, and the Arab world with its huge need for transportation, irrigation, and sanitation, will not dare accept American credits or make big contracts with American engineers if Moscow frowns on the deals.

And refusal of Russia and the United States to work cooperatively to maintain the peace would kill, in their present embryonic stage, all dreams of a vast industrialization program for China.

☆ ☆ ☆

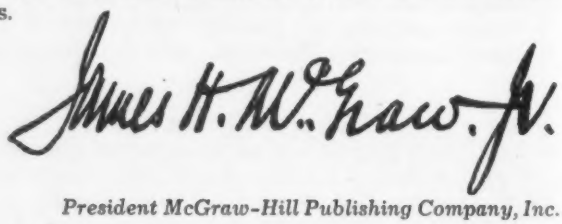
The opportunity to make a major change in the trade map of the world and at the same time to achieve a sharp rise in our own standard of living is before us.

It demands of American business leaders the kind of boldness and imagination that their predecessors displayed when they pioneered this country's unknown West.

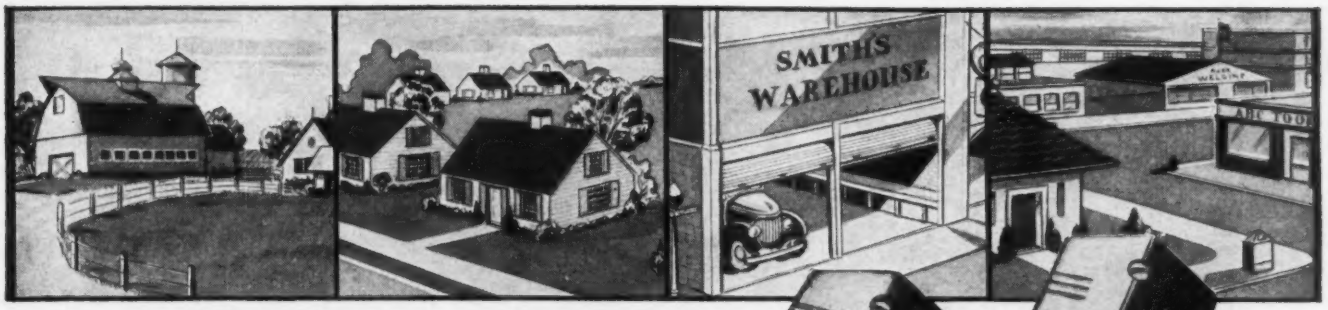
It demands realistic action by men who know that the solution to this country's *real* foreign trade problem under today's conditions lies in boosting *imports* not exports alone . . . men who are not afraid of being paid for what they sell.

It calls for leaders who will approach Moscow and other major customers at once with constructive plans that would parallel in scope those on which this country is waging war . . . leaders who will make it clear at the outset that this bid for cooperative action emphatically demands that each nation shall have complete freedom to determine its internal political and economic organization without interference from the other.

It is *this* caliber of leadership upon which our future hinges.



President McGraw-Hill Publishing Company, Inc.



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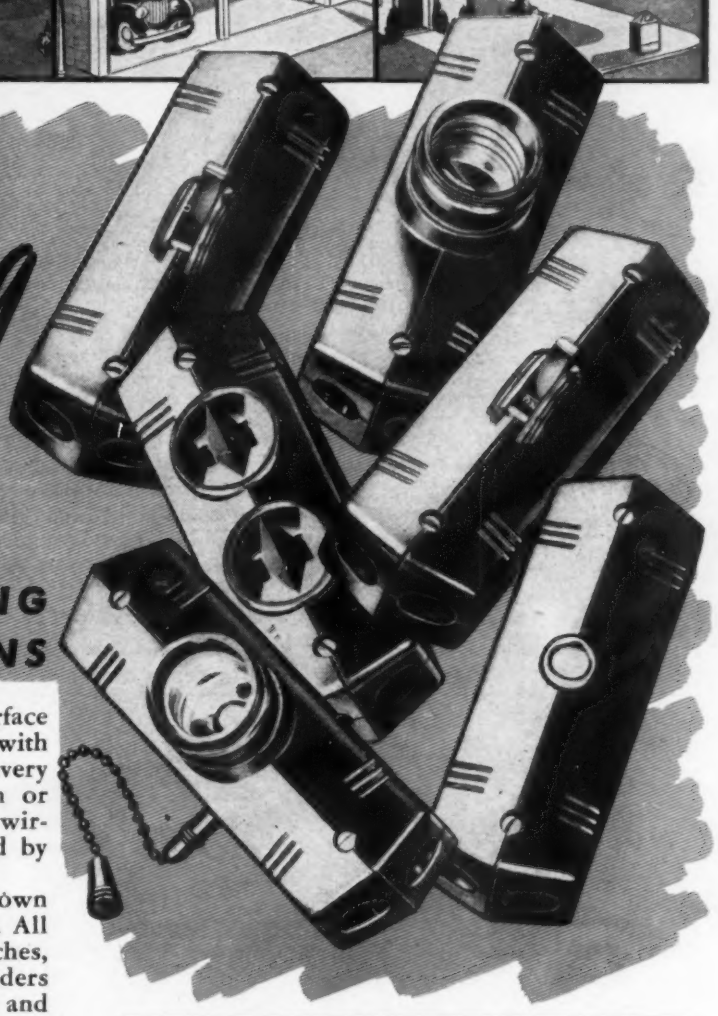

You'll like to use these good-looking, sturdy surface devices. They can be installed quickly and easily with BraidX or BX. They meet all requirements on every surface wiring job whether cables are hidden or exposed. Use them for new surface wiring or for wiring extensions or additions. They are approved by the Underwriters'.

Moncor Surface Wiring Devices are made of brown Textolite, retain their color and resist breakage. All required devices are available: single pole switches, 3-way switches, convenience outlets, lampholders with or without pull chains and junction boxes and rosettes. They can be end connected or side connected (cleat wiring) for surface wiring or back connected for concealed wiring.

FOR FURTHER INFORMATION on Moncor Surface Wiring Devices, other G-E wiring devices or G-E conduits or wires, see the nearest G-E Merchandise Distributor or write to Section CDW-1143-18, Appliance and Merchandise Department, General Electric Company, Bridgeport, Conn.

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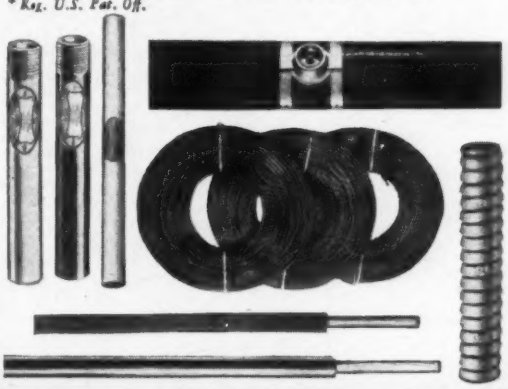

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POLITICAL EXPENDITURES ACCOUNTED FOR, FPC SAYS

That five Northwest utilities have "substantially complied" with FPC regulations for accounting for political expenditures was the decision of the Federal Power Commission, following examination of their books from January 1943 to July 1944. The five utilities are Northwestern Electric, Pacific Power & Light, Portland General Electric, Puget Sound Power & Light and Washington Water Power companies.

The investigation was made at the request of the Washington State Grange and the Washington Public Utility Commissioners Assn., in connection with expenditures to defeat Referendum 25. In undertaking the investigation, the commission pointed out that the Federal Power Act does not prohibit political expenditures and that commission authority is limited to proper accounting of them.

Electric System Involved In Sale of Lumber Town

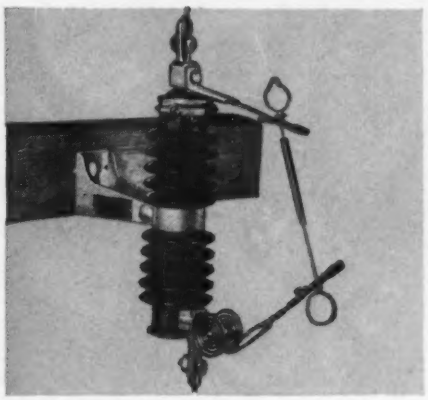
Northern Counties Utility Co., a subsidiary of the Fruit Growers Supply Co., may serve electricity in the lumber town of Westwood, Calif., if California Railroad Commission approval is given a plan of the Fruit Growers to purchase the town, lumber manufacturing plant, sawmill and electric distribution system from the Red River Lumber Co.

The $10,000,000 purchase plan does not include acquisition of the lumber company's hydroelectric plant on the Feather River, transmission lines, nor right to receive energy from Pacific Gas and Electric Co. The utility would distribute electricity for domestic and commercial use and street lighting. Power for operation of mill facilities would be filled by a steam electric plant.

Montana Accounting Case Goes to Washington, D. C.

Oral argument in the FPC order involving capital structure and accounts of Montana Power Co. will be heard in Washington, D. C., on Nov. 29. A lengthy hearing was held earlier this year at Butte, after which briefs were filed by the commission, the power company, American Power and Light and the $6 preferred stockholders.

The commission order asks the power company to show cause why it should not adopt the FPC staff report under the commission's uniform system of accounts and write off about $50,000,000 from its books.



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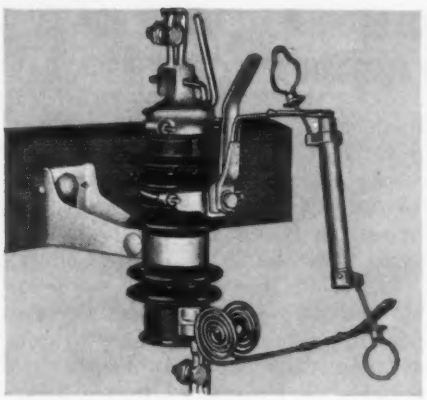

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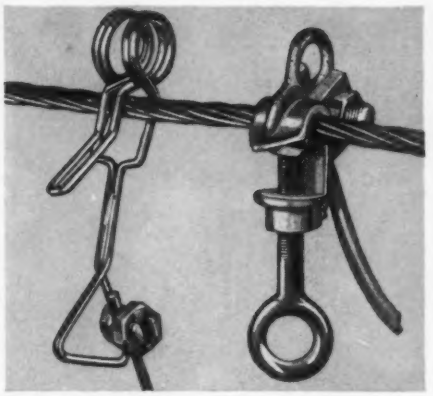

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All Kearney fuse links are designed to operate at full load well below the charring point of fibre —the material used as a liner in all cutout cartridges. You may have had failures of cutout cartridges on heavily loaded lines, but not if you are using Kearney fuse links. Or, your cutout cartridges may be operating on the ragged edge where there is not enough heat to cause actual charring, but quite enough to desiccate the tube to the point where the rupturing capacity of the cutout is greatly impaired.

In easier days when lines and fuse links were carrying only a fraction of their rated loads the temperature margin of safety was sufficient. With today's loads you are inviting certain trouble unless you know the operating temperature of your fuse links and cutouts at full load current. If you haven't investigated ask your supplier for this information or better still change to Kearney—the fuselinks with the low temperature characteristic. Your inquiry on this subject will be welcomed by Dept. "H."

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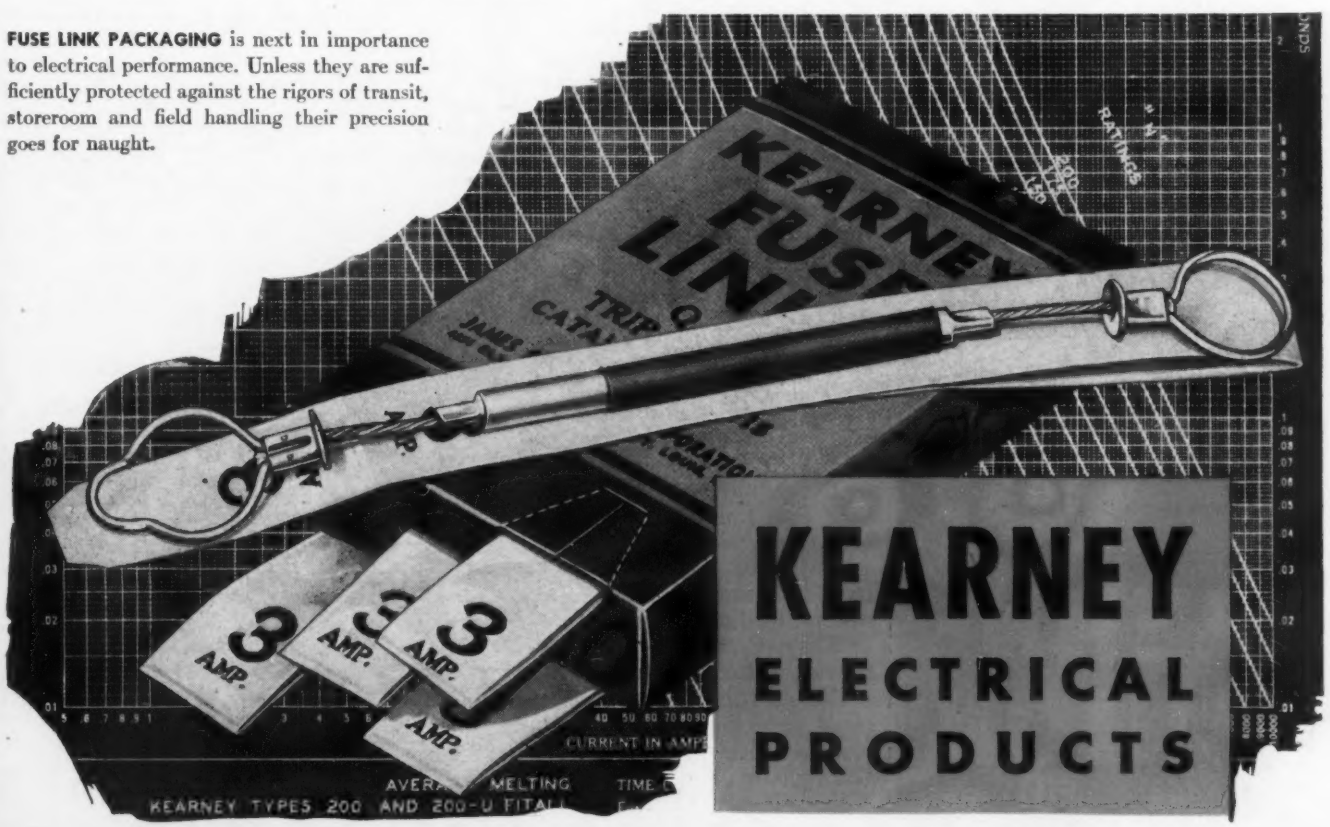

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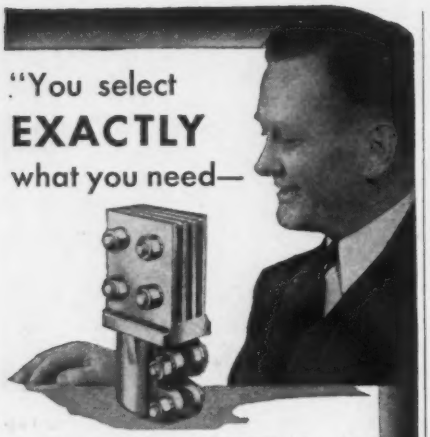

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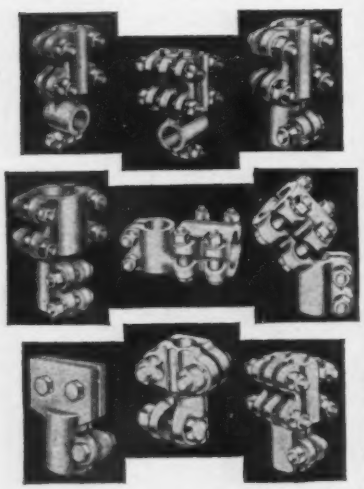

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OREGON REA CANNOT BUY CALIFORNIA PROPERTIES

Contending that the application was in violation of the state Public Utilities Act, the California Railroad Commission last month denied permission for sale of Public Utilities California Corp. properties in Del Norte County, Calif., to the Coos Electric Cooperative in southern Oregon. The act provides in part that no franchise to own or operate any public utility business in the state be granted to a foreign corporation.

The Oregon REA had taken the position that it would not be a public utility subject to regulation in California, but had proposed to continue service to all customers served by the California Corp. and any other persons applying for service.

Electrical properties involved were a diesel-electric station at Crescent City, Calif., a 20-mile, 11-kv. transmission line to the Oregon border and distribution systems in the towns of Crescent City and Smith River.

Opposition Registered to CVP 160-Acre Limitation

Opposition to a proposed compromise bill on the 160-acre land limitation provision of the Reclamation Act as it relates to California's Central Valley Project was expressed recently by members of the CVP committee of the Irrigation Districts Assn. of California.

A draft of the proposed compromise was presented at a recent meeting of the committee in Modesto, attended by Charles E. Carey, regional director of the Bureau of Reclamation. It calls for payment of 3% interest on construction costs by water users owning over 160 acres of land.

The proposed bill, which would also continue the policy of fostering family-sized farms, is expected to be completed for presentation to Congress in November.

● California Oregon Power Co. recently acquired electric properties of California Public Service Co. in Lakeview, Ore., and Alturas, Calif. With sale of these properties to Copco and its Mendocino County, Calif., properties to Pacific Gas and Electric Co. (EWest, October), California Public Service will dissolve.

Facilities purchased by Copco include rural lines and a hydroelectric plant on New Pine Creek in Lake County, Ore., and distribution lines in Modoc County, Calif.

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53,500 lbs. 300,000 CM bare copper stranded wire .926′ per pound.
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STANDARD ENGINEERS NOTEBOOK

VOL. 1-W NO. 9

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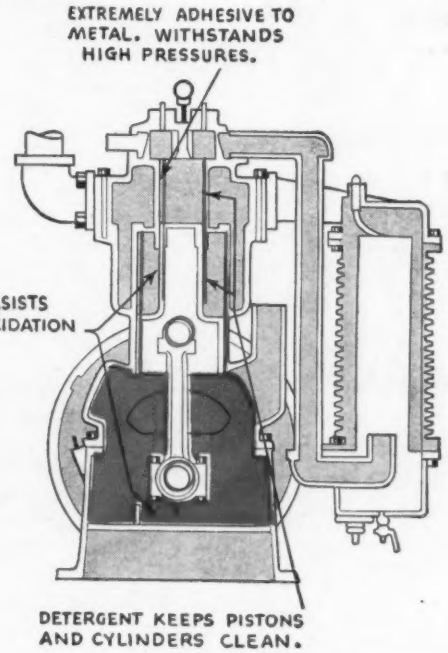
Manufactured from selected base stock oils and special inhibitors, Calol Multi-Service Oils have increased the efficiency of air compressors for many operators.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DETERGENT KEEPS PISTONS AND CYLINDERS CLEAN.

The inhibitors in Calol Multi-Service Oils prevent the formation of excessive gum and sludge caused by contact with air, pressure and contaminants. They also possess detergent qualities which keep cylinders, pistons and other moving parts clean.

There is a wide range of viscosity grades in Calol Multi-Service Oils so selection of exactly the proper weight for each compressor can be made, thus providing an oil that will keep the oil feed down to the correct rate. The grades are: 55X - (SAE 20); 65X - (SAE 30); 75X - (SAE 40); 85X - (SAE 50).

Lubricants recommended for good pump lubrication

The correct and most efficient lubricant for each part in every type of pump may be found among Standard's numerous Calol products. Those generally used are listed in the chart below.

PARTS TO BE LUBRICATED	LUBRICANT
PUMPS — Reciprocating Steam Driven	
Steam Cylinders and Valves	
Pressures above 150 lbs.	Calol Cylinder Oil-155PX or 190PX
Pressures below 150 lbs.	Calol Cylinder Oil-130X or Calol Valve Oil-130X
External Bearings and Eccentrics, Oil	Calol Red Engine Oil-15
Grease	Calol Grease-3
Triplex, Geared Pumps	
Exposed Gears	Calol 304 Gear Grease or Calol Pinion Grease-2
Bearings, Oil	Calol Red Engine Oil-15
Grease	Calol Grease-2 or -3
Eccentrics	Calol Grease-2 or -3
Guides	Calol Grease-2 or -3
Rotary; Centrifugal and Screw Type Pumps	
Bearings, Oil	Calol Turbine Oil -15
Pin Cups, Grease	Calol Grease-1
Compression Cups	Calol Grease-2 or -3
Ball or Roller Bearings Tight Housing, Oil	Calol Turbine Oil -15
Grease	Calol Grease-2 or Calol H. M. P. Grease-1

Standard Fuel and Lubricant Engineers are always at your service. They'll gladly give you expert help — make your maintenance job easier. Call your Standard Representative or write Standard of California, 225 Bush St., San Francisco 20, California.

STANDARD OF CALIFORNIA

REA FUNDS EARMARKED FOR WESTERN STATES

A total of $591,365 has been earmarked by REA for loans in the eleven Western states during the current fiscal year, it was announced last month by the Department of Agriculture. The allotments, based on estimates of unelectrified farms as of July 1, 1944, are part of a $12,500,000 national allocation representing one-half of the REA loan funds available during the year.

Allocations in the West and unelectrified farm estimates on which they are based:

	Farms without Central Station Electric Service July 1, 1944	Allotment for loans during the fiscal year ending June 30, 1945
Arizona	10,368	$ 36,778
California	14,058	49,868
Colorado	27,236	96,613
Idaho	10,463	37,115
Montana	31,023	110,047
Nevada	1,813	6,431
New Mexico	27,205	96,504
Oregon	14,129	50,119
Utah	5,711	20,259
Washington	14,986	53,159
Wyoming	9,718	34,472

Postwar Expansion Subject Of REA Meeting in Denver

Outlining plans to carry electricity to many of Colorado's 60,000 unelectrified farms, officials of the Rural Electrification Administration and the Department of Agriculture recently conferred on postwar expansion with representatives of rural cooperatives in Denver.

During the last eight years the proportion of Colorado farms served with electricity has increased from one in ten to four in ten, it was reported. More than $11,000,000 has been loaned by the REA for construction of more than 6,000 miles of distribution lines to serve 17,000 consumers, according to officials.

● SETTLING a 15-year dispute over water rights of the Verde, Salt and Gila rivers in Arizona, a judgment has been entered for the Buckeye Irrigation Co. and against the Salt River Valley Water Users Assn. and the Roosevelt Irrigation District. The Maricopa County Superior Court awarded Buckeye 1.1% of all water diverted at Granite Reef Dam by the Water Users and ordered the Roosevelt district to pay the cost of pumping 8,750 acre-ft. of water from Buckeye wells. It was claimed that the Roosevelt wells caused water to be lost from Buckeye wells.

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Electrical Connectors

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undoubtedly are in formation now. For better results and lower costs Ilsco Products are indispensable. Learn the newest developments in

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FABRICATED COPPER TUBE PARTS
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The States Company
Test Blocks and Meter Testing Equipment

R. Thomas & Sons Co.
Pin-type and Suspension Insulators

Electroline
Wire Rope Fittings

EDISON COMPANY TO SERVE KAISER'S FONTANA PLANT

Entire power requirements of the Fontana steel plant of the Henry J. Kaiser interests will be furnished by Southern California Edison Co., Ltd., as the result of a recently negotiated five-year contract embodying rate reductions approved by the California Railroad Commission.

Under terms of the contract, it is estimated that the steel plant will pay $550,000 a year for three-phase, 50-cycle energy at 66,000 volts delivered to the mill. With a connected load of 20,100 hp., a usage of 7,500,000 kwh., and with a load factor of 90%, the net bill will be lower than would result from the existing schedule.

The contract, retroactive to May 1, 1944, may be cancelled by Kaiser upon 90 days written notice, but only at the expense of $7,500 payment for each month of the unexpired portion of the lease.

Los Angeles Power Plant Ready to Go to Chile

Crated and awaiting shipment to Chile is operating equipment of the Los Angeles Department of Water and Power's smallest and second oldest power plant, purchased by the Chilean government last spring. It has been repaired and overhauled preparatory to service in the South American country.

The 4200-hp. River power plant originally went into service in San Fernando valley in 1917, but has been only in intermittent operation in recent years. It was put out of service entirely in July 1943 for lack of sufficient water for economical operation. Though the plant's generator was originally built for a mining project in Arizona, it was altered by Westinghouse in 1917 for sale to the department.

● No OUTDOOR Christmas lighting will be done this year, if the request of the Office of War Utilities of the War Production Board is followed. In a release from OWI, Oct. 18, this request was made of city officials, civic clubs, chambers of commerce, merchants and citizens generally, at the request of the Solid Fuels Administration for War. No request is made concerning indoor Christmas lighting, whether in homes or in stores, but outdoor lighting such as festooned store fronts and decorated streets, as well as outdoor home decorations are asked to be curtailed or eliminated. The scarcity of lamps for Christmas tree sets and of sets themselves is likely to have an inhibiting effect on all Yule lighting.

INVENTION NEEDED

Established, well financed manufacturer with national distribution is interested in new products for postwar manufacture and sale. Interested primarily in domestic electrical appliances. State nature of device but *do not send drawings or details unless patented.*

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J. G. CORRIN, Los Angeles
R. F. HAMILTON, Denver
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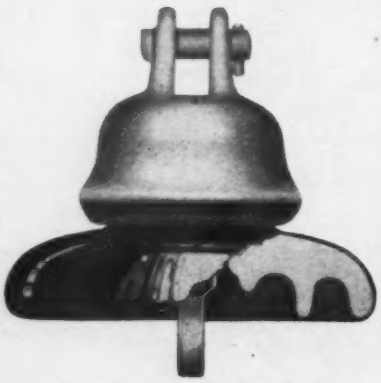
THOMAS STRAIN INSULATORS



7½" DIAMETER DESIGN
No. 1199-B

DRY FLASHOVER . . . . . 65 Kv.
WET FLASHOVER . . . . . 35 Kv.
M & E STRENGTH . . 15,000 Lbs.
SPACING . . . . . 5¾ In.
NET WEIGHT . . . . . 9 Lbs.

● Here's a sturdy 7½" diameter strain unit commonly used for distribution dead-ending which has all the high quality characteristics of the larger 10" disc insulators.

● The 1199-B porcelain corrugations are ample in thickness to withstand rough handling during construction or malicious or accidental breakage on the line, yet are rounded deep enough to allow full leakage surface.

● Service records prove this unit will serve faithfully under all conditions. Call our nearest sales representative for speedy delivery.

WESTERN REPRESENTATIVES

Los Angeles: . . . Farnham & Cunningham
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Seattle: . . . . . Ken H. Best
Phoenix: . . . . . J. E. Redmond Co.
Denver: . . . . . R. F. Hamilton & Assoc.

THE R. THOMAS & SONS CO.
LISBON · OHIO

PEOPLE
made this news

Washington Water Power Completes Reorganization

Advancement of W. L. Thrailkill to assistant general manager of the Washington Water Power Co. was announced recently by J. E. E. Royer, vice-president and general manager. The appointment gives the company two assistant general managers, the other being Richard McKay.

The company also announced the organization of a personnel department, with Kimball I. Jack at its head.

Thrailkill will be directly responsible for personnel, rate and economic research, general sales, finance and accounting and secretarial and corporate departments of the company.

Moving to Washington from the Bitterroot Valley of Montana, Thrailkill was graduated from the state university with honors in electrical engineering in 1927. The same year he became assistant engineer with the Washington Public Service Commission and later was made assistant chief engineer. He joined Washington Water Power in 1933 as a rate engineer and became head of the department in 1940.

The company's consulting and research department, which he had headed, is being dissolved and most of its accounting and engineering functions are being returned to the departments normally responsible for such work.

Jack will continue to supervise company advertising in addition to his personnel assignment. His new duties will include responsibility for employment wage and salary control, training and education, safety and health, personal security of employees, grievances and activities.

In the new set-up T. J. Crosby, publicity director, is relieved of all office routine to enable him to devote all of his time to publicity and a broadened program of public contacts.

● J. F. O'Donnell has been transferred by Westinghouse from the Pacific Coast to Mansfield, Ohio, where he will take charge of the contact sales department. His position as Pacific Coast manager for the electric appliance division will be filled by transfer of John J. Moffatt from Chicago to San Francisco. Moffatt has been with Westinghouse since 1927; was in the advertising department at East Pittsburgh and in sales promotion at Mansfield, St. Louis and Chicago.

● Roy Kimberlin, for the past eight years branch manager for Graybar Electric Co. at Salt Lake City, has been named to the post of district manager for the company at St. Louis, Mo. He replaces W. G. Henges, who has been moved to the Cleveland district. He will be succeeded at Salt Lake City by S. B. Cooper, who has been branch manager at Phoenix, Ariz. E. E. Leavy, from the Los Angeles district, has been appointed branch manager at Phoenix to succeed Cooper. Kimberlin has been 23 years with Graybar, all except the last eight years in San Francisco. He has been prominent in the affairs of the Electrical League of Utah and is currently a vice-president of that organization.

● John C. Steward, Spokane, vice-president and a director of Western Minerals, Inc., and with several years experience as a mining and metallurgical engineer, has been named industrial engineer for the Spokane office of the Bonneville Power Administration. Bonneville is intensifying its market development studies along mineral lines in preparation for postwar industrial planning, the Spokane office said in announcing the appointment.

● A. M. Sweeney has been made manager of sales of all major appliances for the General Electric Co.'s home appliance and construction material sales organization in recent major changes in the company. Sweeney at one time was Pacific Coast sales manager for the National Lamp Works of General Electric Co. in Oakland and later became manager of household refrigerator division.

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THE POPULAR TIME SWITCH LINE KNOWN EVERYWHERE

There is a Tork Clock for every regular switching job; 60 minute, 4 hour or daily cycles.

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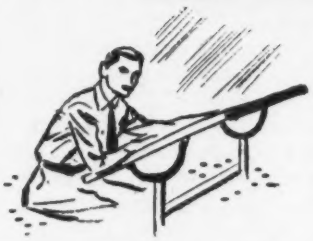
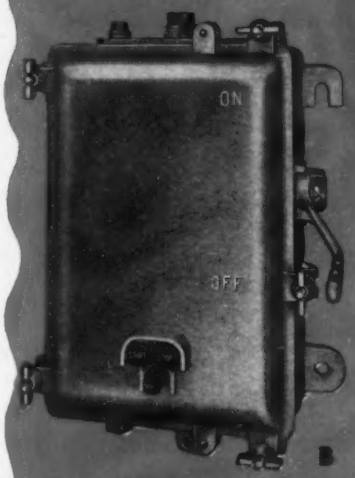
Federal INDUSTRIAL CONTROLS

engineered to *outlast* the equipment they control



Don't be surprised if the Federal controls you buy for one machine *outlasts* two, three or even four others. For—Federal builds 'em for long life. Designs them to withstand the rigors of hard usage. To take in stride shocks . . . vibrations — or what have you. Expect to find, too, ample wiring space . . . easily removable contacts . . . efficient operation . . . ease and economy in maintenance. For safe and dependable control of motor-driven machinery depend on Federal.

A



B

A, Reversing magnetic starter Type "A" sheet steel cabinet

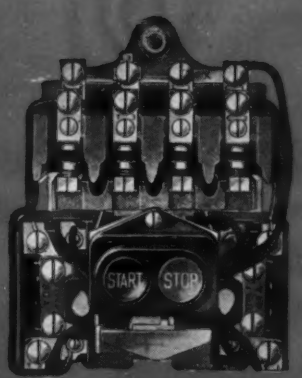
B. Combination motor starter Type "D" weatherproof cabinet

C. Manual Motor starter Type "A" sheet steel cabinet

D. Magnetic Motor starter Type "U"—inside only

E. Push button station

C



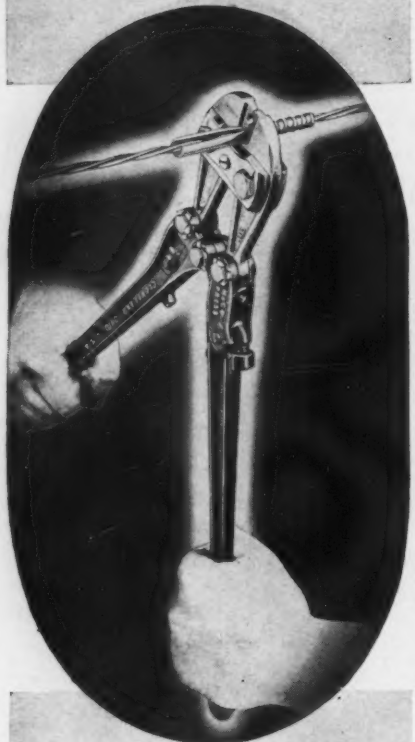
D

E

FEDERAL ELECTRIC PRODUCTS COMPANY

Plants at: 1429 Park Street, Hartford, Connecticut and 50 Paris Street, Newark, New Jersey

Nicopress
REINFORCING SLEEVES
for damaged Copperweld-copper conductors



• Nicopress Reinforcing Sleeves offer an ideal means of strengthening Copperweld-copper conductors at points where one or two of the copper wires have been damaged. These sleeves are split the full length and may be slipped over the damaged section and compressed with the same easy-to-handle Nicopress Tool used in making the regular line splice.

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5100 SUPERIOR AVENUE
CLEVELAND 3, OHIO
Canadian Mfr.—N. SLATER CO., LTD., HAMILTON, ONT., CANADA
Export Distributor
INTERNATIONAL STANDARD ELECTRIC CORP., NEW YORK, N. Y.

R. R. Robertson Resigns From Los Angeles Utility

Following a long and distinguished career, R. R. Robertson has resigned as chief electrical engineer and deputy general manager of the Los Angeles Department of Water & Power. Due to ill health, his retirement request was granted by the board of directors.

Born in Michigan, Robertson spent part of his youth in Montana. He went to Los Angeles in 1911, following service with the Isthmian Canal Commission in Panama. He was employed as draftsman by the Department of Water & Power in 1912. When war was declared in 1917, he enlisted in the Coast Artillery and went overseas as commanding officer of an anti-aircraft battery. He was promoted to the rank of major and placed in command of a sector comprising four batteries.

In 1919 he returned to the department as technical assistant and later was made superintendent of field construction in charge of building San Francisquito Power Plant No. 2. In 1928 he became engineer of construction in the design and construction division; in 1940 he was appointed head of the division. When the water and power bureaus were merged in November 1943, he became chief electrical engineer and deputy general manager of the Department of Water & Power.

Robertson is identified with many important developments on the Los Angeles system, the most outstanding being the two Boulder transmission lines, on which he was in charge of construction.

Utah Power & Light Names Two Division Sales Heads

Appointment of Harold Nordeen as sales manager of the Rexburg division and J. N. Stephens as sales manager of the Preston division was announced recently by Utah Power & Light Co.

Nordeen fills a position which has been vacant since the death of Roy Wallenstein in 1943. He started with the company in 1934 as a power salesman at Provo and two years later was transferred to Rexburg in the same capacity.

Stephens has been with the company since 1926, serving in meter testing work and in various other capacities.

● J. H. Clawson has been named assistant treasurer of Puget Sound Power & Light Co. replacing the late O. W. Bennett. He will have general supervision of all accounting activities.

● C. G. Davidson, general counsel for the Bonneville Power Administration, has joined the Office of War Utilities to assist Director Edward Falck in preparing OWU's demobilization program. Davidson is filling in for Herbert S. Marks, general counsel for OWU, who is now in France studying the needs of power systems in liberated areas. Davidson's assignment with OWU was described as "temporary."

Meyberg Advances Three To Vice-Presidency

Appointment of W. J. Lancaster and W. A. Collier as vice-presidents of the Leo J Meyberg Co. has been announced by President A. H. Meyer. Appointment of L. E. Starkweather as a vice-president was announced last month.

Lancaster will have charge of operations in the San Francisco division and Starkweather will head Los Angeles division activities. Collier will be assistant general manager with headquarters at San Francisco.

Starkweather formerly was sales manager at Los Angeles and Lancaster held a similar post in northern California.

● A. "Pete" Kanekeberg has resigned from Public Service Co. of Colorado to open a business of his own as a manufacturers' representative. Kanekeberg has been district commercial superintendent and has been prominent in the merchandising end of the Public Service Co. for many years. During the war he has headed the company's participation in War Bond drives and other patriotic activities.

● Dana W. Rowton, illuminating engineer and particularly a specialist in street lighting for the Public Service Co. of Colorado, recently resigned to accept a position with the Westinghouse Electric & Mfg. Co. as a street lighting engineer. Rowton presented a paper on the lighting of Denver's streets at the September annual conference of the Illuminating Engineering Society.

● W. A. Smith, a former West Coast resident, has been named consulting engineer for Ohio Brass Co. He was in the West working as an independent engineer in 1930, when he accepted the position as chief engineer for O-B's Barberton plant, which he held until the recent appointment.

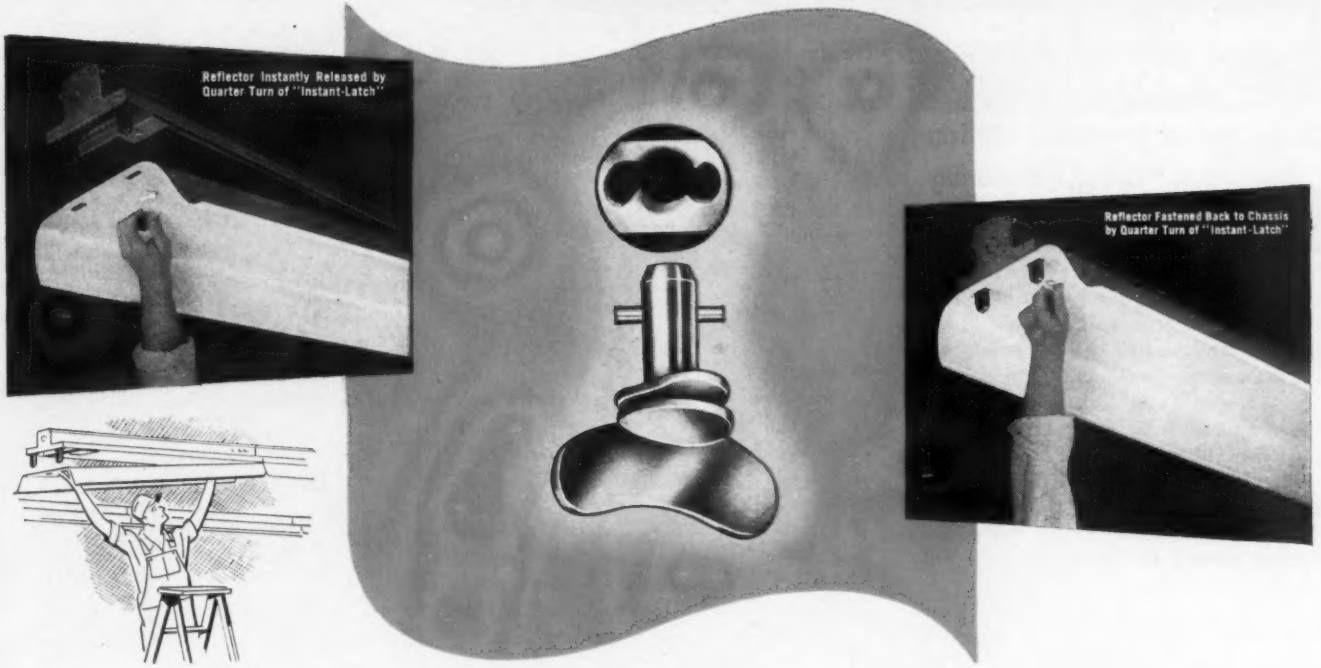
● Lyle Gowdy has been appointed by Northwestern Electric Co. as manager at Camas, Wash. He succeeds Art Jones, who resigned to go into business for himself.

AIRCRAFT TYPE—INSTANT-LATCH

Speeds Installing, Cleaning, Servicing

OF THE NEW

MITCHELITE ALL-STEEL FIXTURES

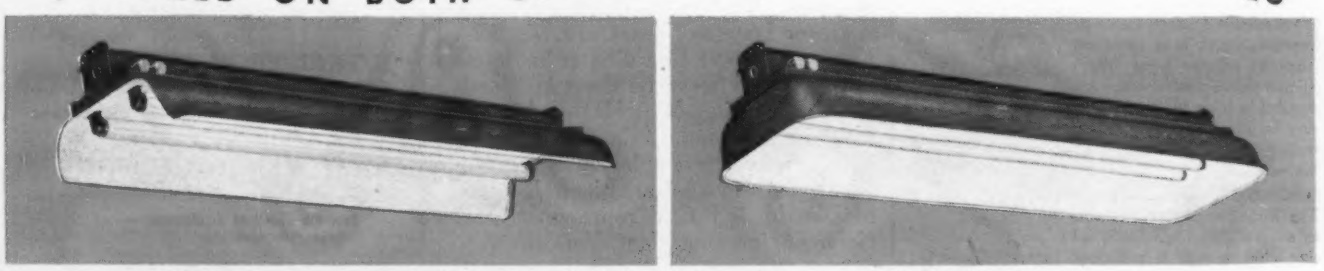

Reflector Instantly Released by Quarter Turn of "Instant-Latch"
Reflector Fastened Back to Chassis by Quarter Turn of "Instant-Latch"

A simple quarter-turn of Mitchell's new aircraft type "Instant-Latch" attaches or releases the reflector . . . instantly. No tools needed. This "Instant-Latch" is a strong cam-type fastener which provides positive tension at all times. No amount of vibration will loosen it. All parts permanently attached—no fussing with small removable parts. No spring to wear out. Two such latches are secured on each reflector.

This is only one of the many MITCHELL features that make it easier than ever to install, clean and service the new MITCHELITE All-Steel Industrial Fluorescent Fixtures.

The new MITCHELITE is available in 2-40 watt, 3-40 watt and 2-100 watt models . . . in open-end and closed-end types . . . including new, perfected 2-40 watt "Instant-Start" units . . . with choice of Baked Enamel or Porcelain Enamel finish. U/L and E.T.L. approved throughout.

FEATURED ON BOTH OPEN-END AND CLOSED-END TYPES



MITCHELITE Accessories provide for every method of mounting or hanging . . . individually or in continuous rows.

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PUNCH-LOK
Streamlined
BANDING and SPLICING METHOD

Saves Time in Connecting • Splicing
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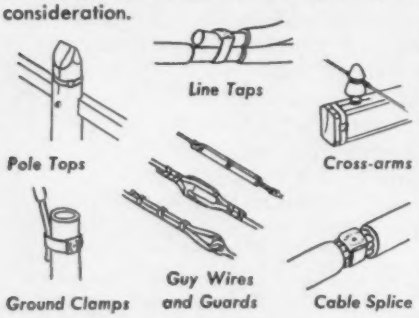
Using Punch-Lok, it takes but a moment to splice a cable . . . to reinforce or mend splits in cross-arms, poles and ladder rails (you don't have to take down wires or installation) . . . to make up flexible cable or solid wire line taps . . . to clamp guy wire guards . . . to connect ground wires . . . to splice cable. It is widely used for connecting hose or repairing leaks in air, water, steam, or other fluid lines. It's easy! Just put ends through clamps and use Loking Tool and your connection is made . . . or use *open end* clamps when obstructions prevent the use of preformed clamps. The connection will withstand any normal pull strain.

All along your lines, the Punch-Lok banding and splicing method saves time, work, money . . . and its ease of application and its safety factors make it worthy of your consideration.



CLAMPS... Made of flat, high tensile galvanized steel or Everdur, which is a corrosion resistant copper base alloy. All clamps are double wrapped. Available from ¾" to 48" I.D. Any large size clamp can be pulled down to fit any smaller diameter.

LOKING TOOL . . . Weight 2½ lbs. Sturdily constructed to assure long life. Locks all size clamps with a sufficient tensional pull.

For illustrated catalog and name of your nearest distributor, write Harry M. Thomas, Pacific Coast Representative, Dept. O, 1554 Oakland Ave., Piedmont 11, Calif.

PUNCH-LOK COMPANY
321 N. Justine St.
Chicago 7, Illinois

Obituary

E. F. Watkins, manager of purchases, Southern California Edison Co., died Oct. 1 at Los Angeles after several months' illness. Sixty-one years of age, he had been with the Edison company for 21 years.

A member of a pioneer California family, Mr. Watkins was born March 25, 1883, in Alhambra. He attended Santa Clara College and in his early business career was manager of California business for the Golden Gate Fruit Co. of New York and was purchasing agent for the Standard Felt Co. of Alhambra.

He joined the Edison company Aug. 1, 1923, as construction tool foreman in the general office, Los Angeles. He was made requisition clerk two years later, and chief requisition clerk in 1927. He was appointed manager of purchases in 1927.

● DARRELL E. SHAW, 49, marine superintendent of the General Electric Co. in the Pacific Northwest, died Oct. 15 in Portland. He had been in charge of installing G-E equipment in Seattle and Portland shipyard shops. A native of Kemptville, Nova Scotia, Mr. Shaw had been employed by the General Electric Co. for nearly 25 years, serving in Chile, India and Russia. He was a member of the American Society of Mechanical Engineers.

● GEORGE PERCIVAL FARR, retired founder of the electrical, construction, engineering and contracting firm of Farr, Robinson & Bird Ltd., died at his home at Victoria, B. C., recently. He had been a resident of British Columbia since 1897, opening his business in Vancouver in 1909 and remaining as an executive of the company until his retirement in 1937. He served as a lieutenant during the last war.

● JOHN DINGWALL MCDONALD, 70, engineer for many years with the West Kootenay Power Co., died at his home in Vancouver recently. Born in Woodstock, Ontario, Mr. McDonald had lived in Rossland, B.C., 46 years, 42 of which he was employed as an electrical engineer. A son, Lieut. John D. McDonald, is R.C.N. representative at Neon Engineering plant, Vancouver.

● JAMES J. BURKE, 70, president of the Salt Lake City general contracting firm which bore his name and also a director of the Utah Light & Traction Co., died Oct. 9 after a long illness. Mr. Burke was born in Pittsburgh, Penn., but had been a resident of Salt Lake City since 1899. He was a graduate of Duquesne University.

RELIANCE TIME SWITCH

10 to 50 Amp.
•
Single Pole
Double Pole
Two Circuit
Indoor and
Outdoor Types
•
Listed in Underwriter Laboratories.

A complete line of automatic time switches for practically every installation. Highest quality construction with a record of dependable service for nearly 35 years. Specify Reliance Time Switches and be sure you are specifying the best. Catalog on request.

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AUTOMATIC LIGHTING CO.
1929 Mead Street Racine, Wisconsin

H. H. Van Luven

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MUtual 5173

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Lead—Braid Covered Cables and Wires
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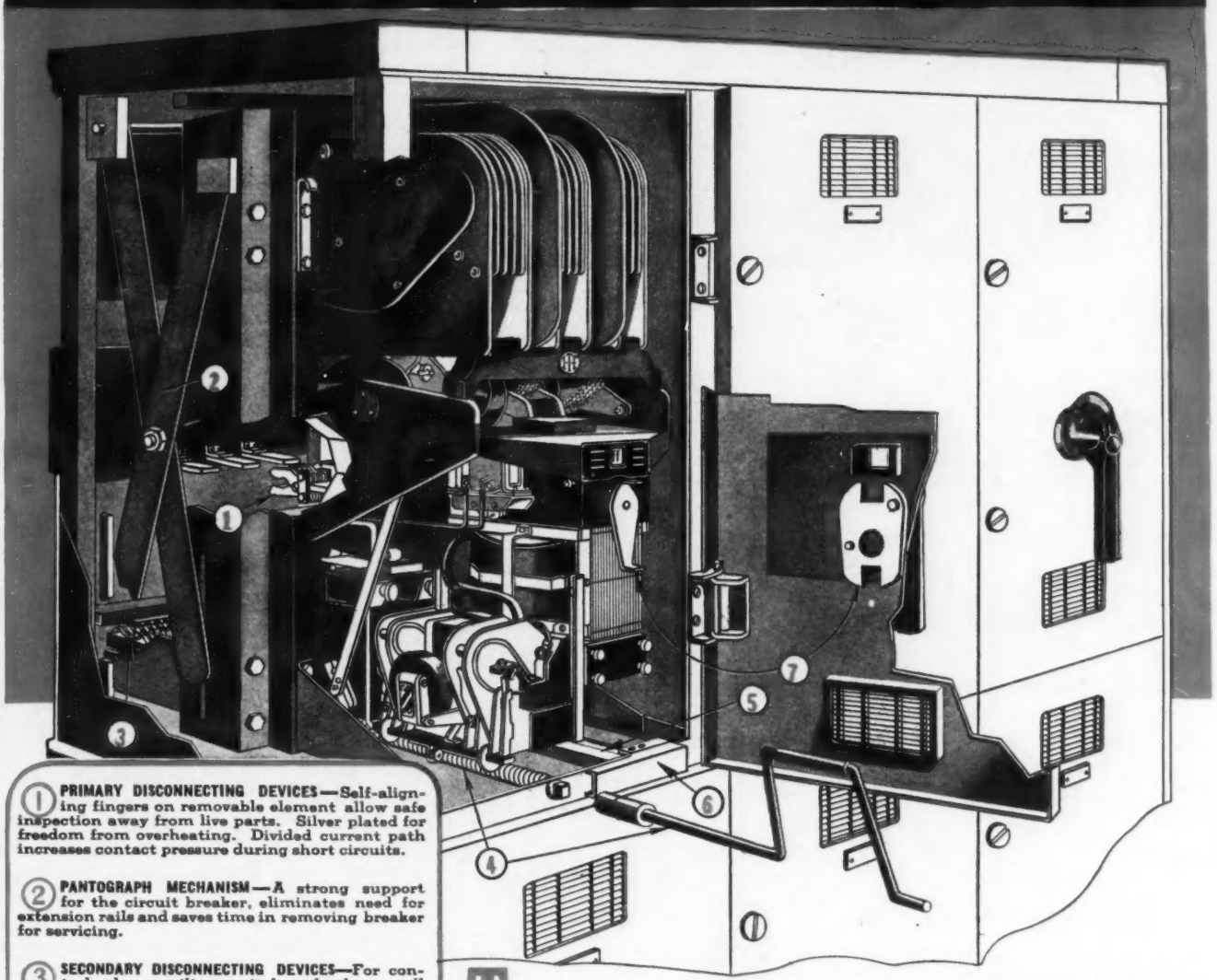
TRICO FUSE MFG. CO.
Fuses, Oilers, Clip Locks and Fuse Pullers

KNOX PORCELAIN CORP.
Electrical Porcelain

Details of I-T-E Drawout Switchgear ARE WELL WORTH YOUR STUDY



(1) **PRIMARY DISCONNECTING DEVICES**—Self-aligning fingers on removable element allow safe inspection away from live parts. Silver plated for freedom from overheating. Divided current path increases contact pressure during short circuits.

(2) **PANTOGRAPH MECHANISM**—A strong support for the circuit breaker, eliminates need for extension rails and saves time in removing breaker for servicing.

(3) **SECONDARY DISCONNECTING DEVICES**—For control relay, auxiliary switch and other small wiring circuits. Self-adjusting, silver plated. Flexible members mounted on removable element. Contacts closed at Test Position of breaker.

(4) **DRAWOUT SCREW AND REMOVABLE CRANK**—Quick operating, triple-threaded screw allows fast drawout of breaker to Test or Removal Position. Crank has universal joint to allow operator to work comfortably.

(5) **INTERLOCK TRIP SHAFT**—Provides safety for circuit and operator by actuating trip mechanism whenever the breaker is moved into or out of contact. Current cannot be broken on disconnecting devices.

(6) **INTERLOCK SLIDE**—Connected to trip shaft, must be moved to expose end of drawout screw and allow removable crank to be attached. Crank cannot be in place with breaker closed.

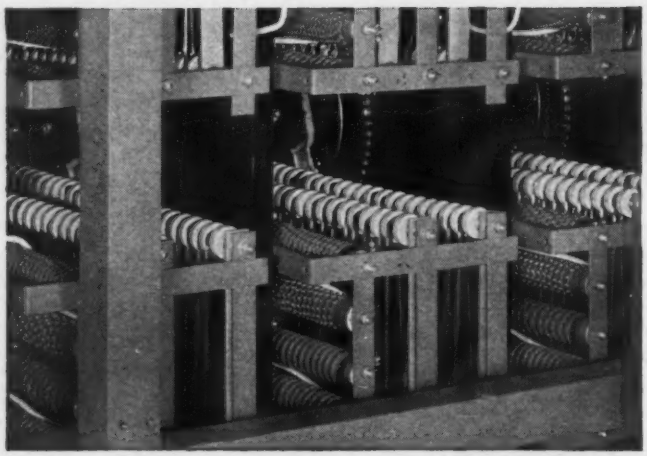
(7) **OPERATING MECHANISM**—Operating handle, furnished for both manually and electrically operated breakers, disconnects automatically from breaker when door is opened. Manual operation requires only a ninety degree turn of the handle.

There is a specific reason behind each of the Multumite switchgear details described here . . . either improved performance, safety or convenience. Close study will indicate how completely every contingency is provided for and the thoroughness with which each detail is engineered.

Only a few of the many features necessary to proper circuit breaker protection are mentioned. Catalog 6002 fully identifies and illustrates the requirements for dependable performance, safety and convenience in control and distribution of electric power. Call your nearest I-T-E representative for Catalog 6002 or write to I-T-E Circuit Breaker Company, 19th and Hamilton Streets, Philadelphia 30, Pa.

Representatives in Principal Cities

I-T-E AIR SWITCHGEAR



ADAPTABLE and DEPENDABLE RESISTORS

Adaptability and dependability of resistors assume primary importance in the assembly of large rheostat control units. The wide range of resistance values and capacities that can be built up from the Ward Leonard line is limitless. The many types and mounting arrangements permit the meeting of load requirements in minimum space. Whatever your requirements you will find a Ward Leonard Resistor that exactly meets your conditions. Send for Bulletins.

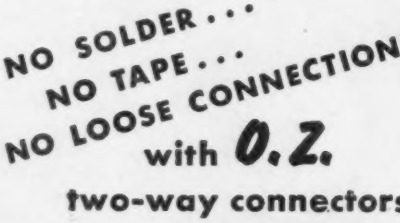
WARD LEONARD

RELAYS • RESISTORS • RHEOSTATS

Electric control (WL) devices since 1892.

WARD LEONARD ELECTRIC COMPANY, 68 South St., Mount Vernon, N. Y.

NO SOLDER . . .
NO TAPE . . .
NO LOOSE CONNECTIONS
with O.Z.
two-way connectors



—for joining two same size cables, end to end, in a straight line.

O. Z. Two-Way Connectors are designed for *positive contact, ease of installation, accessibility for maintenance,* and *salvageability of both connector and cover.* This fitting, with cover made of canvas Bakelite, makes a neat compact connection of high mechanical and dielectric strength. Available with and without cover for cable sizes from No. 8 to 2000 Mcm.

The O. Z. Catalog, No. 125, gives many helpful "Facts about Fittings" and tabulated sizes, prices for: *Conduit Fittings — Cable Terminators — Junction Boxes — Solderless Connectors — Power Connectors — Grounding Devices.* A letterhead request will bring your copy.

O.Z ELECTRICAL MFG. CO.
262 BOND STREET · BROOKLYN, 2 N Y

Represented by 7055

ASSOC. SALES ENGINEERS . . 324 No. San Pedro St., Los Angeles 12, Cal.
THE FRANK H. BRAN CO. . . . . 894 Folsom St., San Francisco 7, Cal.
LEONARD S. FOLEY . . . . 131 South West 4th Ave., Portland 4, Oregon
JOSEPH D. SINNOTT . . . . . 1203 Western Ave., Seattle 1, Wash.

HELWIG COMPANY

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Carbon Products

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Multiflex Brushes
Give Better
Commutation,
Longer Life,
Less Commutator Wear,
That Extra Demand Required,
Better Performance
All Around

Pacific Coast Offices

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San Francisco 1, Calif.

166 Jackson Street
Seattle, Washington

324 N. W. Broadway
Portland, Oregon

225 W. Pico Boulevard
Los Angeles, California

BUY MORE WAR BONDS

TRADE notes

Jack Fenton has been appointed factory representative in northern California for the major appliances of Landers, Frary & Clark, makers of the Universal household appliances, according to B. C. Neece, vice-president and general sales manager. Formerly associated with Graybar Electric Co. in the same territory, Fenton will work closely with Thompson-Holmes Ltd., distributors for Universal appliances. Until appliances are available the program of signing up prospective buyers on the "U" Plan for "V" Day is being developed among dealers. Newest help in that direction is a War Bond folder in which bonds later to be converted to the purchase of home appliances are kept segregated by the customer. The folders have four sections representing items for which the consumer may wish to save bonds, such as security and education, purchase and maintenance of a home, one for Universal household equipment and another for miscellaneous uses.

● J. G. PHILLIPS, recently celebrated the 15th anniversary of his founding of the business of the Phillips Radio & Electric, 452 Columbia St., New Westminster, B. C. Phillips started in the business as an exclusive radio dealer, and later expanded his business to carry a complete line of electrical appliances. During more recent years furniture, home furnishings, and coal and wood ranges have also been added to the stock. Two years after the establishment of the business H. D. Phillips, brother of the founder, joined the organization and later Terry Phillips, a younger brother now serving with the RCAF, became associated with the company.

● A PLASTIC airplane parts factory will be established in Anaheim, Calif., by the General Electric Co. in the postwar period, it was announced recently by Raymond M. Alvord, commercial vice-president of the company. A 12-acre site near Santa Fe and Union Pacific railroads will be purchased for the manufacturing plant, Alvord said.

● A THIRD STAR was added recently to the Army-Navy "E" flag which flies above the Thermador Electric Mfg. Co. plant at Los Angeles. The company has received its fourth "E" award in recognition of continued high efficiency in production of war material.

● APPOINTMENT of three distributors in the Far West was announced last month by Electromaster. The Afton-Lamp Electric Co., Boise, Northwest Supply Co., Butte, and the Puget Sound Appliance Sales Co., Seattle and Spokane, are the three named. Electromaster is now engaged 100% in war production but in the postwar will resume manufacture of electric ranges and water heaters exclusively, according to Gerald Bulett, vice-president in charge of sales.

● HUME & RUMBLE LTD., one of the largest electrical contracting concerns in Western Canada, has expanded operations on Vancouver Island. The company has established offices at 322 Scholard Bldg., Victoria, and is now operating in the electrical contracting and power maintenance field in Victoria and throughout the Island generally. In addition to the new branch, the 26-year-old firm has offices and work shops at Vancouver, New Westminster and Edmonton.

● CROSLEY CORP. has appointed the Heating & Air Conditioning Supply Co. of Reno as its distributor in most of Nevada and in northeastern California. The Reno firm also maintains a large service shop, a branch office in Hawthorne, Nev., and a subsidiary company, Metals Mfg. Co. in Reno. Clyde M. Mast is manager, L. J. Kearney is superintendent of refrigeration and air conditioning and Les McCurry is sales manager.

● CHARLES STRIEBY, of Strieby & Barton Ltd., Los Angeles, was in Cincinnati recently to attend the general sales conference held by Ilsco Copper Tube and Products, Inc. Reconversion, termination annd cancellation routines and postwar plans were discussed.

● BENDIX RADIO, a division of Bendix Aviation Corp., has appointed John C. Wilson as Pacific District manager and established offices in the Western Merchandise Mart, San Francisco. Territory covered is the eleven Western states.

● BERT H. ABBOTT has been appointed manager of the electrical service and repair department of Kent-Roach Ltd. in Victoria, B. C. The department is being enlarged and will handle all types of electrical appliance service and repair.

● POSTWAR Westinghouse radios will be distributed in the West by Westinghouse Supply, except in Honolulu, where the distributor will be the Hawaiian Electric Co., according to recent announcement by the company.

INSTALL TRICO

POWDER-PACKED

RENEWABLE FUSES

For these PERFORMANCE FEATURES:

DEPENDABILITY—The self contained POWDER-PACKED renewal element eliminates all chances for mistake—always safe—dependable. Fuse link is carefully protected against damage.

TAMPER-PROOF protection. Stops dangerous and vicious practice of "doubling up" fuse links.

Noninterchangeable construction — prevents the inefficient practice of substituting ORDINARY bare links.

LINK SUPPORT — the powder-packing prevents sagging and stretching of fuse link — stops premature blowings.

SAFE TIME-LAG—Not over-done—prevents early deterioration of motors and windings.

LIFE-TIME CASINGS—All blowing action is confined to the inner renewal casing. No cleaning, scraping or replacing of parts necessary.

SELF-ALIGNING—Flexible blades make perfect contact with fuse clips.

SIMPLICITY—Remove only one cap—no loose washers—no time wasted.

TRICO "*Powder-Packed*" FUSES COST NO MORE!

COAST REPRESENTATIVES
H. H. Van Luven, Los Angeles — Wallace R. Lynn Co., San Francisco
Albert S. Knight, Seattle — W. E. Young Co., Denver

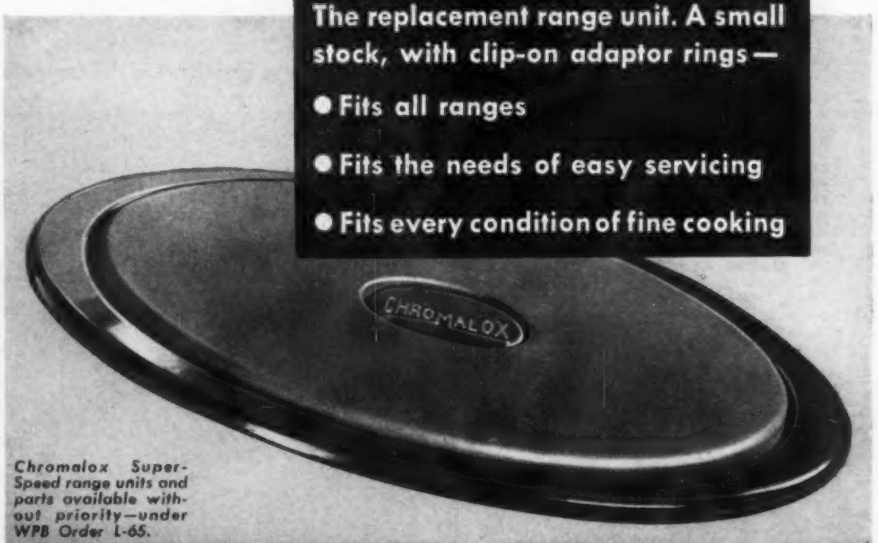
TRICO FUSE MFG. CO.
Milwaukee Wisconsin

It fits everywhere!

CHROMALOX HEATFLO

The replacement range unit. A small stock, with clip-on adaptor rings—

- Fits all ranges
- Fits the needs of easy servicing
- Fits every condition of fine cooking



Chromalox Super-Speed range units and parts available without priority—under WPB Order L-65.

EDWIN L. WIEGAND CO. 7540 Thomas Blvd., Pittsburgh 8, Pa.

MONTGOMERY BROTHERS: 61 Fremont St., San Francisco 5, Calif.; 911 Western Ave., Seattle 4, Wash.; 2333 N. W. Westover St., Portland 10, Ore.; 420 S. San Pedro St., Los Angeles 13, Calif.
THE PETERSON CO., 1925 Blake St., Denver 2, Colo.

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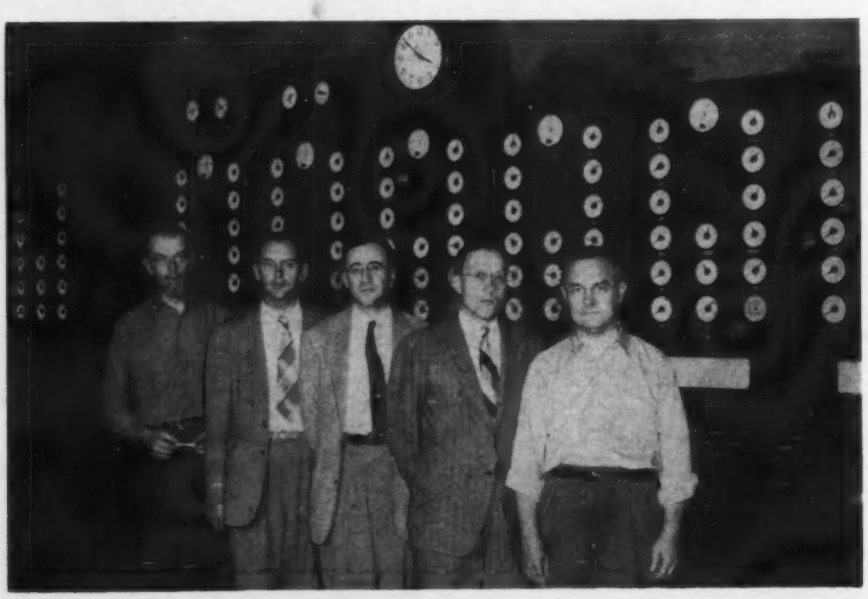
PROFILES *of the month*

Leslie A. Hicks, president of Hawaiian Electric Co., presents award to James L. McCarthy, Westinghouse engineering representative, on completion of 40 years of service. The event was marked also by a "birthday" dinner. McCarthy holds a Navy commendation for his work at Pearl Harbor since mid-1941 and was recipient in 1943 of the Westinghouse Order of Merit for distinguished service. He joined Westinghouse at East Pittsburgh in 1904, as an electrical tester. Others present at the ceremonies were Rollo J. Cobban, John L. Baer, G. S. Jacobs, E. A. Wilgus

Above: A convivial group at the recent Golf dinner staged by the San Francisco Electric Club. In foreground, Les Seibert manipulates his candid camera. On his left is George Garthorne; on his right, Ken Ryals. Below: Russian engineers pictured at Coulee Dam during recent visit. They are on inspection tour of hydroelectric and other power installations preparatory to replacing Dnieprostroi Dam. Left to right the Russian engineers are: A R. Kudirsky, N. Y. Shpiakin, A. V. Natanson, M. D. Kozloz. On extreme right is I. S. Locke, of International General Electric Co., interpretator for the visiting group. (USBR Photo)



ANOTHER DAY IS COMING

FIRST there was D-Day, the beginning of the end in Europe. Soon, we hope, will come Victory Day, with the mad dreams of Hitler crashing to earth in a welter of Nazi defeats and then there will be Victory Day in the Pacific, the swiftly approaching collapse of the fanatic Japanese Empire. It is not too early to look forward to the Day of Peace. The Day of Peace when Civilization will reclaim the world... when nations will live and let live... when the sea routes of the armed convoys and warships across the Pacific will be followed by cargo vessels and passenger liners in friendly trade with the lands of the Orient. It is not too soon to begin preparing for that day; not too soon for the Western Coast of America to make itself ready to supply the peoples of Asia and the South Pacific with the goods and the food they so sorely will need. Electric Power is ready to do it's share of this giant's task.

P·G·and E·

PACIFIC GAS AND ELECTRIC COMPANY

S19—1044-X

* *The elephant is one of the longest-lived of all creatures . . . some elephants have lived as long as 100 years.*

The new home should be so planned and constructed that it will suit the needs of its owner for a long time after it is built . . . will remain modern for many years. *This is possible only when the home is properly wired!* With adequate wiring, every electrical demand of the present and foreseeable future can be met. *Now* is the time to prepare yourself so that you can advise home-planners intelligently on the important subject of home wiring.

PACIFIC COAST ELECTRICAL ASSOCIATION

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